

MODERN Machine Shop

VOLUME 16 • NUMBER 4
SEPTEMBER, 1943

Contents

HOWARD CAMPBELL, Editor

Published monthly by
GARDNER PUBLICATIONS, Inc.
431 Main St., Cincinnati 2, Ohio

DON G. GARDNER
President and General Manager

JOHN M. KRINGS
Advertising Manager

RICHARD S. KLINE
431 Main St., Cincinnati 2
MAin 0182

G. M. FILLMORE
342 Madison Ave.
New York 17
Murray Hill 6-3899

GEORGE H. MEYERS
Tribune Tower, Chicago 11
Superior 2290

CHARLES H. DEILY, JR.
310 West Durham St.
Philadelphia 19
Chestnut Hill 1198

Member

CCA

Printed in U. S. A.

Copyright 1943 by
Gardner Publications, Inc.

CONTENTS

Shop Measurements with Light Waves, I.....	118
By Joseph Dauber	
Good Light Will Help Win the War.....	134
By John J. Neidhart	
How To Grind Carbide Form Tools.....	156
1943 National Metal Congress and War Conference Display..	164
Blind Employees Have Perfect Safety Record.....	168
"Accuracy Guaranteed" by Joshua Hendy Iron Works.....	176
Ideas from Readers	
—Tool Lifter for Planer, By A. W. Payne.....	194
—Clamping Equalizer for Multiple Fixture.....	196
—Using Nail as Sheet Metal Punch, By A. H. Waychoff...198	
—Toolmaker's Center Punch, By C. F. Fitz.....	200
—Auxiliary Small Parts Vise, By Chas. H. Willey.....	205
—Accurate Spacing of Holes on a Bolt Circle, By W. S. Haskell.....	208
New Shop Equipment	216
Services Directory	394
Cartoon	396
The Last Word	398
Index to Advertisements.....	401

ARMSTRONG

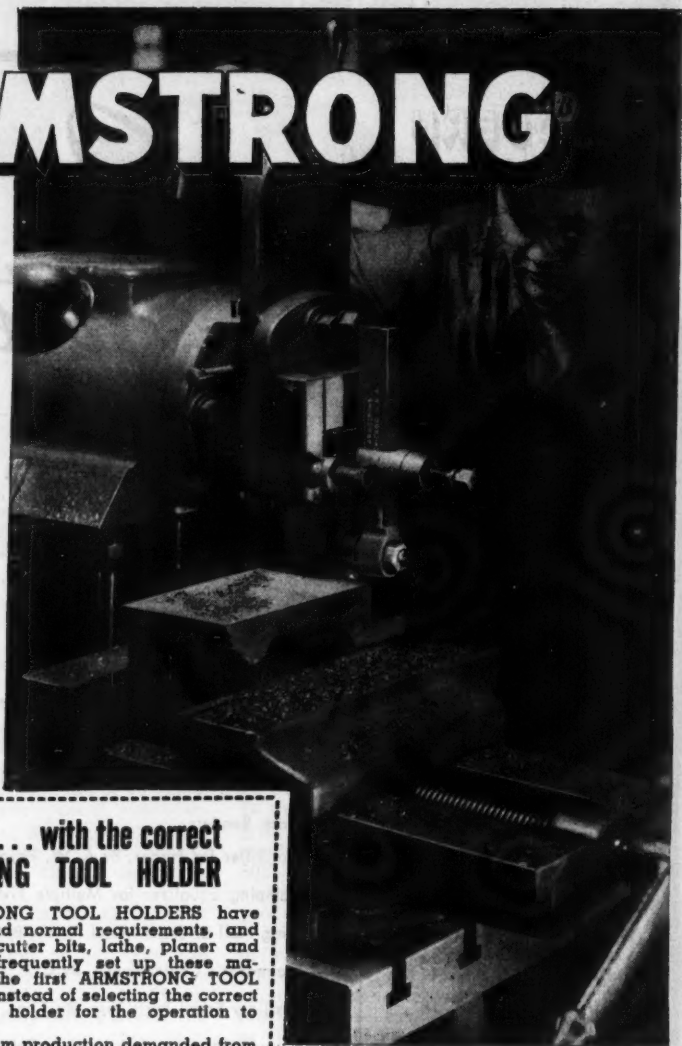


Start right . . . with the correct ARMSTRONG TOOL HOLDER

Because ARMSTRONG TOOL HOLDERS have strength far beyond normal requirements, and take all standard cutler bits, lathes, planer and shaper operators frequently set up these machine tools with the first ARMSTRONG TOOL HOLDER at hand, instead of selecting the correct size and type tool holder for the operation to be performed.

Today with maximum production demanded from every machine tool and man hour, it is important that every operation be started right, with the correct ARMSTRONG TOOL HOLDER . . . the tool holder, especially designed for that operation and which holds the cutter at the correct angle, gives the most efficient tool approach, and cuts efficiently even at greatly stepped-up speeds and feeds.

Write for an ARMSTRONG C-39 Catalog today, and check to be sure that you are using the correct ARMSTRONG TOOL HOLDERS for each operation.



ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

328 N. Francisco Ave.

Chicago, U. S. A.

Eastern Warehouse
and Sales:

199 Lafayette St.,
New York



MODERN Machine Shop

SEPTEMBER, 1943

VOL. 16, No. 4

CINCINNATI, OHIO

We Present ---

— as the feature in this issue — the first half of an article comprising a clear and practical exposition of the theory of light-wave measurement and the use of "optical flats" for measuring to millionths of an inch. The article, which is entitled "Shop Measurements with Light Waves," has been written for us by Joseph Dauber, Acme Scientific Division, Acme Industrial Company, Chicago, Illinois.

— on page 134 — an informative article — "Good Light Will Help Win the War" — in which John J. Neidhart, engineer, Lighting Division, Westinghouse Electric and Manufacturing Company, Cleveland, Ohio, presents a number of practical pointers on maintaining a high level of lighting efficiency.

— on page 156 — a timely discussion on the grinding of carbide form tools. Diagrams are presented which aid the reader in more fully understanding the principles involved in actual grinding operations on carbide tools.

— on page 164 — an announcement of the 1943 National Metal Congress and War Conference Display to be held at the Palmer House, Chicago, October 18 through 22.

— on page 168 — an article of particular interest to every quantity-production manufacturer, entitled "Blind Employees Have Perfect Safety Record." Several distinct advantages resulting from the employment of blind workers are explained.

— on page 176 — "Accuracy Guaranteed" by Joshua Hendy Iron Works — the story of a Pacific Coast marine engine manufacturer who works to half a thousandth and ensures accuracy by making his own tools.

— on page 194 — the designs of several tools and devices for speeding and facilitating the performance of various operations in the shop, under the heading "Ideas from Readers."

— on page 216 — illustrated announcements of new shop equipment and materials.

ARMSTRONG



Start right . . . with the correct ARMSTRONG TOOL HOLDER

Because ARMSTRONG TOOL HOLDERS have strength far beyond normal requirements, and take all standard cutter bits, lathe, planer and shaper operators frequently set up these machine tools with the first ARMSTRONG TOOL HOLDER at hand, instead of selecting the correct size and type tool holder for the operation to be performed.

Today with maximum production demanded from every machine tool and man hour, it is important that every operation be started right, with the correct ARMSTRONG TOOL HOLDER . . . the tool holder, especially designed for that operation and which holds the cutter at the correct angle, gives the most efficient tool approach, and cuts efficiently even at greatly stepped-up speeds and feeds.

Write for an ARMSTRONG C-39 Catalog today, and check to be sure that you are using the correct ARMSTRONG TOOL HOLDERS for each operation.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

328 N. Francisco Ave.

Chicago, U. S. A.

Eastern Warehouse
and Sales:
199 Lafayette St.,
New York



MODERN Machine Shop

SEPTEMBER, 1943

VOL. 16, No. 4

CINCINNATI, OHIO

We Present ---

— as the feature in this issue — the first half of an article comprising a clear and practical exposition of the theory of light-wave measurement and the use of "optical flats" for measuring to millionths of an inch. The article, which is entitled "Shop Measurements with Light Waves," has been written for us by Joseph Dauber, Acme Scientific Division, Acme Industrial Company, Chicago, Illinois.

— on page 134 — an informative article — "Good Light Will Help Win the War" — in which John J. Neidhart, engineer, Lighting Division, Westinghouse Electric and Manufacturing Company, Cleveland, Ohio, presents a number of practical pointers on maintaining a high level of lighting efficiency.

— on page 156 — a timely discussion on the grinding of carbide form tools. Diagrams are presented which aid the reader in more fully understanding the principles involved in actual grinding operations on carbide tools.

— on page 164 — an announcement of the 1943 National Metal Congress and War Conference Display to be held at the Palmer House, Chicago, October 18 through 22.

— on page 168 — an article of particular interest to every quantity-production manufacturer, entitled "Blind Employees Have Perfect Safety Record." Several distinct advantages resulting from the employment of blind workers are explained.

— on page 176 — "Accuracy Guaranteed" by Joshua Hendy Iron Works — the story of a Pacific Coast marine engine manufacturer who works to half a thousandth and ensures accuracy by making his own tools.

— on page 194 — the designs of several tools and devices for speeding and facilitating the performance of various operations in the shop, under the heading "Ideas from Readers."

— on page 216 — illustrated announcements of new shop equipment and materials.

Shop Measurements with Light Waves, I

[The first half of an article comprising a clear and practical exposition of the theory of light-wave measurement and the use of "optical flats" for measuring to millionths of an inch]

By JOSEPH DAUBER

Acme Scientific Division, Acme Industrial Company, Chicago, Illinois

FOR many types of high precision measurement, light wave methods surpass all others for combined simplicity, accuracy, portability, and economy. In fact, for certain measurements no other method can be used.

Nevertheless, in the mechanical industries the use of light wave measurements is still in its infancy. Largely responsible for this state of affairs has been the widespread misconception that considerable knowledge of optical theory and physics is required for successful use of the equipment.

Nothing can be farther from the truth. No knowledge of optical theory is necessary in order to make measurements to a fraction of a ten-thousandth of an inch or, in some cases, to a millionth of an inch. In many shops such measurements are being made by personnel with absolutely no previous measuring experience, which is possible because only common sense, average eyesight, and a knowledge of simple arithmetic are required.

In this article we shall present a

discussion of the subject of light wave measurements in the manner and sequence which experience indicates is most practical, as follows:

First, we shall describe a number of shop uses of the simplest type of light wave measuring equipment, showing a non-theoretical method of interpreting the interference "bands." Second, we shall briefly investigate the theory of light wave measurements, which will then be more easily digested because the reader will already have acquired the "feel" of the method and equipment.

The Equipment

For measuring flatness, the only equipment required is a monochromatic light source and an optical flat of known flatness. For measuring dimensions of objects, such as length, diameter, and so on, a toolmaker's flat (or another optical flat) and a suitable set of gage blocks are also required. As auxiliary equipment, the operator should keep on hand a camel hair or sable hair brush for removing dust particles from the measuring and

Fig. 1—Set-Up for Checking Ball Diameter. The operator is lowering the optical flat on to the work and the gage block. The angle "A" should be kept as small as convenient, so that the operator looks nearly straight down on the work.

measured surfaces, a supply of lens tissue and or clean, lintless cloth, a bottle of grain alcohol (wood alcohol or methyl alcohol should be avoided) for cleaning purposes and to assist in wringing gage blocks to the toolmaker's flat. Isopropyl alcohol is also good.

The following definitions of equipment will be of assistance, particularly to readers who have had little experience with light wave measurements:

Monochromatic Light Source. The word "monochromatic" is derived from the Greek words monos (one) and chroma (color). A monochromatic light source is a lamp which emits light of only one wave length, and therefore of one color, since the color of any light is determined by the wave lengths of which it is composed. Light wave measurements are best made with light of only one wave length. Actually, no such light source exists, but some come sufficiently close to being truly monochromatic to give very satisfactory results. Of the more available possibilities, we have found a helium lamp to be most suitable. White light can be used for very limited applications, but has so many disadvantages that its use has been completely abandoned, for reasons which will be mentioned later.

Optical Flat. An optical flat, as we use the term, is a piece of hard trans-



parent material, usually glass, of which (usually) one side is optically ground and polished to some specified flatness. The second side is simply polished for clear vision. The flats are most frequently in the form of thick circular discs of various standard diameters from one inch to ten inches, and standard flatnesses (within one millionth, two millionths, five millionths, and ten millionths of an inch).

Toolmaker's Flat. A toolmaker's flat is a thick disk of selected tool steel, lapped on both sides to within specified limits of flatness and parallelism, and to a surface finish of 1 rms.* On the highest grade, each surface is lapped flat within five millionths and parallel within two millionths; there are several other grades,

* Root-Mean-Square; a term meaning a running average of the height of the surface irregularities in microinches.

Fig. 2—Measurement of Surface Flatness. Interference Band Patterns of Common Occurrence. Bands as observable by the method described herein exist only when the optical flat and the work are nearly in contact, but the work surface is not parallel to that of the flat. Practically all patterns usually encountered are combinations of those shown here. The slope of the work surface with respect to the flat, in millionths of an inch per inch, is equal to the number of bands per inch multiplied by 11.6. One complete band consists of one light line plus one dark line.

not finished to such close limits of accuracy. Various diameters are obtainable.

Light wave measurements as made in the shop, and as described herein, are essentially comparative. In measuring flatness, the surface being inspected is compared with the surface of known flatness on the optical flat. In measuring dimensions, the object is compared with a gage block or other length standard.

Preliminary Practice

In all techniques a certain amount of practice is necessary before skill is attained. It is therefore suggested that prospective users of optical flats practice the following procedure:

As a test workpiece, select a piece with a polished surface, either metal or glass. A gage block, another optical flat, a steel flat, or a good piece of plate glass on a dark background will serve well. Place the workpiece under the monochromatic light source in such a way that it appears well illuminated when viewed nearly vertically.

Brush both the surface of the optical flat and the work surface with the camel hair brush to remove loose dust particles. Lower the optical flat, face down, gently onto the work, keeping their surfaces parallel. (The monochromatic light source is reflected by both the surface of the work and that of the flat; when the two reflections are superimposed on each other, the respective surfaces are parallel.) Dark

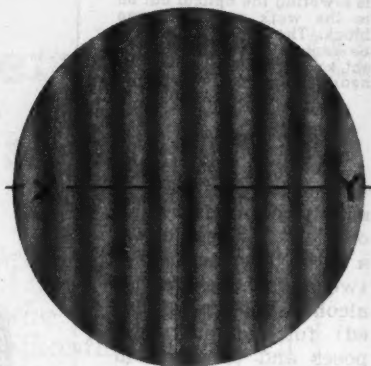


Fig. 2A—The work surface is accurately flat, as shown by the straightness, parallelism, and even spacing of the bands. There is a wedge-shaped layer of air between the work and the flat. Press with the finger at X or Y. At one of these points, pressure causes the bands to broaden and become fewer. This point is the thickest part of the air wedge (low point of work). Difference in height between X and Y is $8\frac{1}{2}$ bands or 98 millionths of an inch.

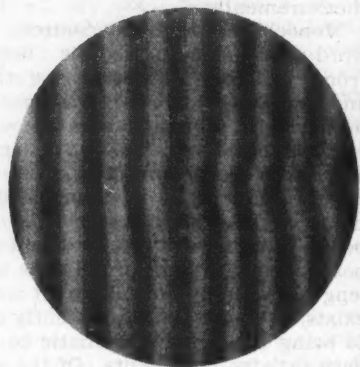


Fig. 2D—A depression or a hill in an otherwise flat surface. Apply same tests as in Fig. 2C. If a depression, the curvature points away from the thick part of the air wedge; if a hill, the curve points toward the thick part.



Fig. 2B—Work has a hollow or hill. The high or low point is under the center of the "bull's-eye." If pressure there causes broadening of bands, work is concave. If pressure near edge causes bull's-eye to move toward point of pressure, work is convex.

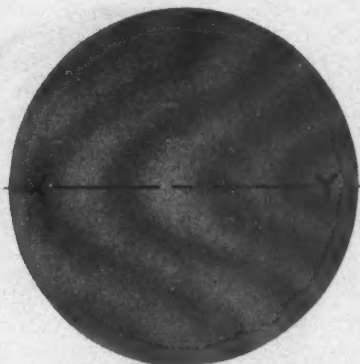


Fig. 2C—There is either a ridge or a valley along the line X-Y. Pressure on the optical flat at one end of this line will cause the bands to become broader and fewer. This is the low part of the work (thick part of the air wedge). Curvature due to a hill always points toward the thick part of the air wedge; curvature due to a hollow always points away from the thick part of the air wedge. Difference in height between X and Y is $3\frac{1}{2}$ bands or 40 millionths.

Depth or height of corrugation is 2 bands.

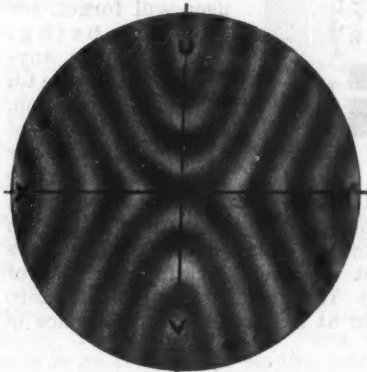


Fig. 2E—A "saddle-shaped" or toric surface. This is frequently found on plate glass. There are two curvatures in opposite directions, one along the line U-V, the other along the line X-Y. Press at U, V, X, and Y in succession; the points toward which the pattern moves are low. Also, press at the center; the bands perpendicular to the line joining the high points tend to broaden out.

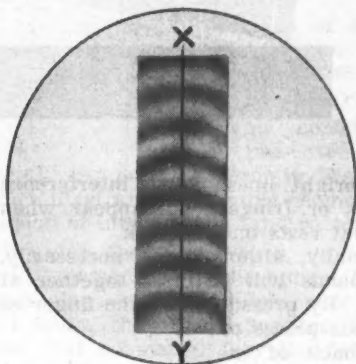


Fig. 2F—A Gage Block, with High or Low Edges. Press at X or Y to determine where the air wedge is thickest. If the edges are low (most common), center of the bands will point toward the thick portion of the wedge. Departure from flatness is about $4/10$ of a band.

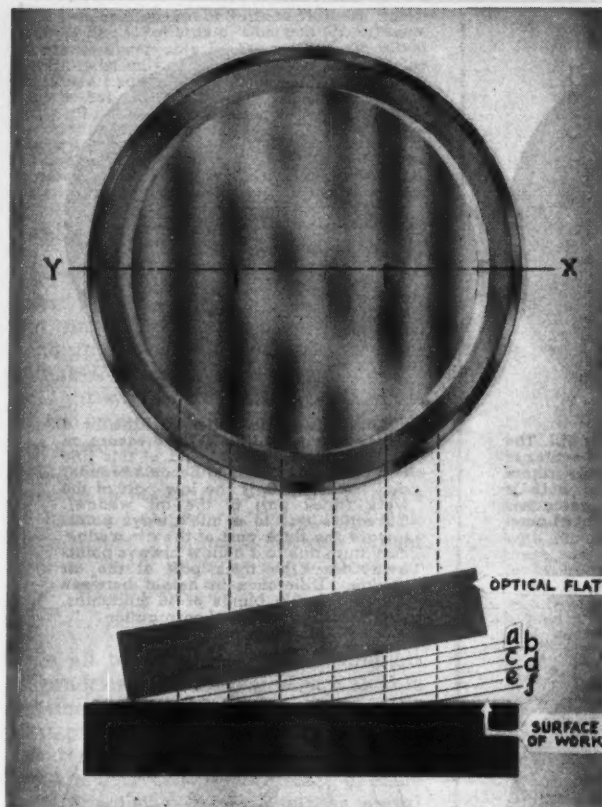


Fig. 3—Interpretation of Bands on Truly Flat Surfaces. Lines marked a, b, c, d, e, and f, represent imaginary planes. Think of these planes as always parallel to the optical flat, no matter which way it is turned. The spacing between the imaginary planes is always 11.6 millionths of an inch. The dark bands appear wherever the planes intersect the surface of the work.

terns shown in Fig. 2.

The light-wave bands comprise, in effect, a contour map of the work surface. The use of interference bands for measuring will be simplified if the user will forget, for the time being, that light has anything to do with their formation, and will think of them as contour lines on a map of the

surface under examination. On maps, contour lines are drawn through points of equal height. The lines might represent height intervals of (say) 100 feet, starting from zero height at sea level. The difference in

and bright lines, called **interference bands**, or **fringes**, will appear when the flat rests on the work.

Usually, although not necessarily, the bands will be close together at first. By pressing with the finger at various places on the back of the optical flat, certain points will be found, such that pressure will cause the bands to broaden out and become fewer in number. They will assume one of the typical pat-

terns shown in Fig. 2.



Fig. 4—The imaginary planes tilt with the optical flat.

Fig. 5—Bands Caused by a Spherical Surface. The "bull's-eye" pattern can be caused by other types of convex or concave surfaces. The shape, spacing, and concentricity of the bands would be different, however.

height between any two points on a slope is equal to the number of contour lines between them, multiplied by the change of altitude which one contour line represents, provided there is no reversal of slope between the two points.

In using an optical flat, "sea level" is the polished face of the flat. The interference bands represent height intervals, not of 100 feet, but—when viewed with an Acme Monochromatic Light Source—of 11.6 millionths of an inch.

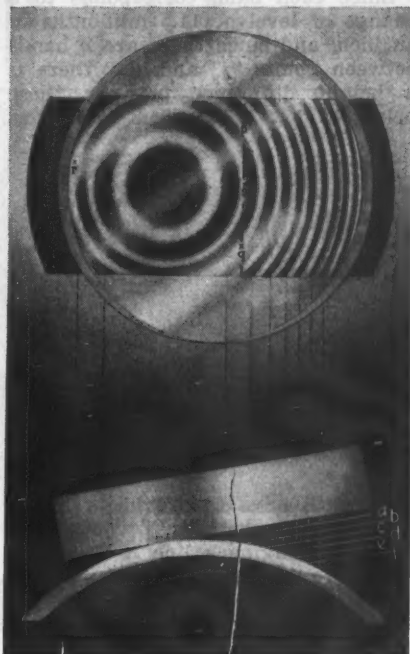
Thus, between the center of one dark band and the center of the next dark band, the level of the work has risen or fallen 11.6 millionths of an inch. The same is true of the bright bands. Therefore

$$\left\{ \begin{array}{l} \text{the difference in} \\ \text{height between} \\ \text{two points, in} \\ \text{microinches}^* \\ H \end{array} \right\} = \left\{ \begin{array}{l} \text{the number of} \\ \text{bands between} \\ \text{the points} \\ N \end{array} \right\} \times \left\{ \begin{array}{l} \frac{1}{2} \text{ wave length of} \\ \text{light used in} \\ \text{microinches} \\ 11.6 \end{array} \right\}$$

This fact, plus the simple geometrical method of the next section, is sufficient to explain all the shop uses of optical flats.

Geometrical Method. Figure 2A shows straight, evenly spaced parallel bands. These are caused when the work is as truly plane as the optical flat. The two surfaces are separated by a thin, wedge-shaped air space because the optical flat rests on small

* Millionths of an inch. One microinch = one millionth (0.000001) of an inch. Although popularly introduced in connection with surface finish measurement, the term is not restricted to that field. In surface finish specifications, however, it usually is an average value. (So-called root-mean-square average.) In this article, microinch and millionth of an inch are used interchangeably.



particles of dust which are extremely difficult to remove.

This condition is presented in greatly exaggerated form in Fig. 3, which illustrates the simple geometric method of interpreting band patterns.

Imagine the planes a, b, c, d, e, and f, all parallel to the optical flat. Each plane is 11.6 millionths of an inch below the other. Suppose, further, that no matter how the flat is tilted or bent, the planes always remain parallel to it and the same distance away. Since the optical flat is slightly tilted, these planes intersect the surface of the work as shown. If the work is truly flat, the planes will intersect it in a series of parallel, equidistant lines, as seen from above. These lines are the centerlines of the dark bands in the illustration.

Since each band corresponds to a change of level of 11.6 millionths of an inch, and since there are 3 bands between points "j" and "k," there is a height difference between these points of $3 \times 11.6 = 34.8$ millionths.

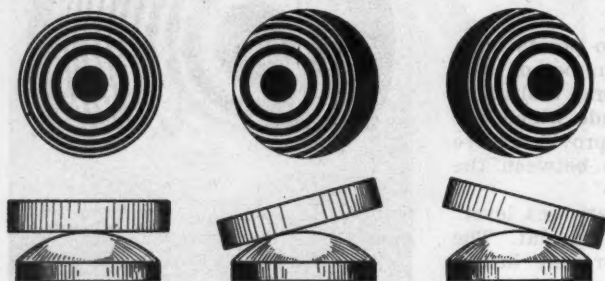


Fig. 6—Convex surface: finger pressure at edges.

We still have to provide a means of deciding whether "j" or "k" is higher. Imagine a line X-Y perpendicular to the bands. Pressing at "X" with the finger would cause the flat to tilt more nearly horizontal, and the planes a, b, c, d, e, f to tilt with it. They would therefore intersect the work surface at more widely spaced intervals and would also be fewer in number.

Pressing at "Y" would have the opposite effect, and more bands would appear, with closer spacing. Therefore, if pressure at a point "spreads" the bands, that point of the work is low, while if finger pressure "compresses" the bands, it is a high point. Note, however, that thin workpieces may readily be bent by the pressure if caution is not exercised.

Figure 5, by construction, shows that the pattern of Fig. 2B originates from the contact of the optical flat with a convex or concave surface.

The work under the optical flat shown in Fig. 5 being convex, finger pressure near the edge will cause the flat to roll on the work, and the "bull's-eye" center of the pattern will tend to move toward the finger.

If the work were concave, or hollow, pressure at the center would bend the flat to more nearly assume the shape of the work, and the bands would broaden and become fewer. This effect is illustrated in Figures 6 and 7. Note that points "p," "q," and "r" in Fig. 5 are all at

the same level (because they are all on the same band), that point "s" is 9/10 of a band or 10.4 microinches above this level, and that "s" is the high point of a cross-section through "p," "q," and "s."

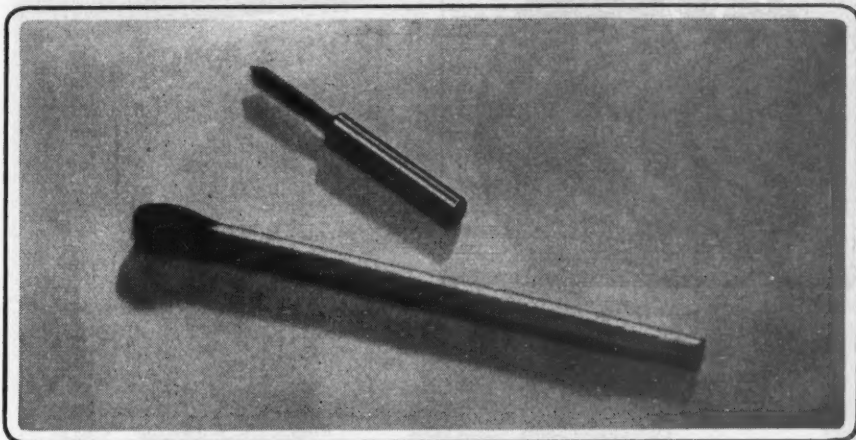
Figure 8 shows one of the patterns that is developed when the flat is laid on a convex cylinder. The tests for



Fig. 7—Concave surface: finger pressure at center.

high point are the same as previously explained. As the high end of the flat is brought closer to the work, the curved bands become longer. When the flat contacts the work all along the ridge, the bands become parallel lines similar to those of Fig. 3, but having variable spacing.

a MATCH STICK



dwarfs this **PERFEX** gage

The comparison between Perfex's 0-80 Male Thread Gage and a match, graphically illustrates what Perfex can do in maintaining fine accuracy even in the most minute gage.

With the high standards required in today's aircraft industry, on all parts regardless of size, manufacturers have come to recognize Perfex's reliability in adhering to the extremely close limits that are being specified.

If your requirements in gages are being held to closer limits why not write us for information on Perfex's line of gages today?

*Perfex Manufactures Thread, Plug, Radius, Contour, Profile,
Flush Pin, Solid Snap, and Specials to Your Blueprints.*

ACCURACY

PERFEX

OUR CREED

**PERFEX GAGE
and TOOL CO.**
3606 GAYLORD DETROIT, MICHIGAN

shown
pres-
e flat
bull's-
end to

were
r hol-
at the
end
more
the
work,
nds
and
This
rated
nd 7.
oints
r" in
l at
e all
s" is
ches
the
ough

terns
laid
for

usly
the
the
hen
ong
illel
but

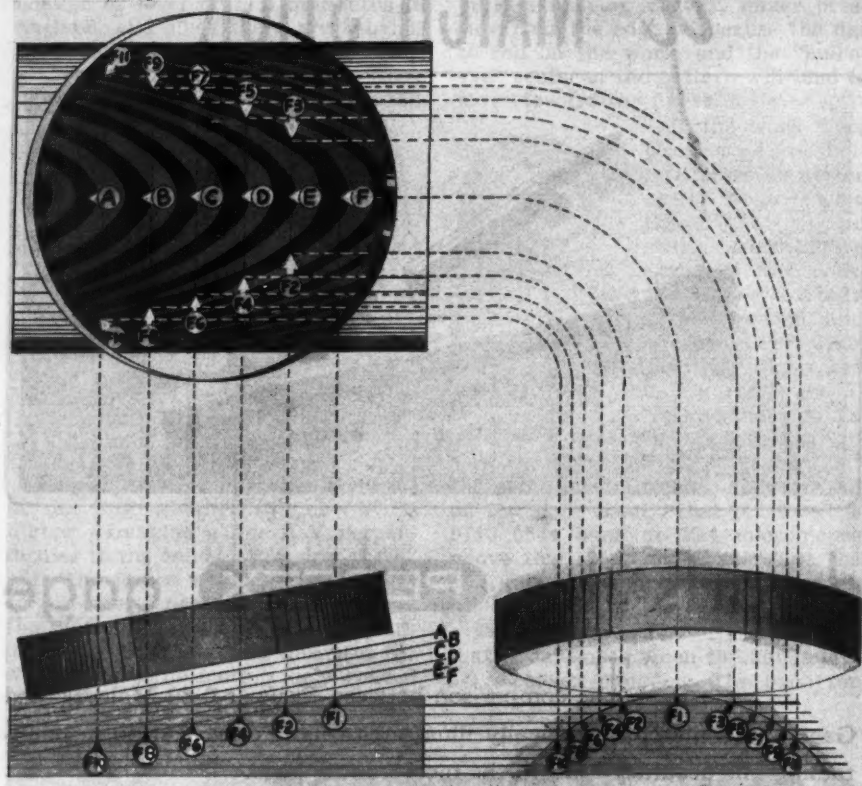


Fig. 8—Bands Caused by a Cylindrical Surface. The optical flat is inclined with respect to the cylinder axis. The plane F intersects the surface of the cylinder at points F-1, F-2, F-3 . . . F-11. By following the line joining any one of these points in each of the three projections, it can be seen how the fringes are given the shape shown.

Measuring Diameter of a Ball

The principles outlined above apply also when the flat is used for measuring dimensions of objects.

Figure 9 shows a $\frac{1}{4}$ -inch ball being checked for size. The equipment required is an optical flat of 2-inch minimum diameter (in this particular case), a toolmaker's flat or another optical flat to serve as the base, a $\frac{1}{4}$ -inch gage block, and a monochromatic light source.

First, the gage block is wrung down

on the surface of the toolmaker's flat. The ball is then placed at a convenient distance from the gage block, and the optical flat across both. The calculations will be easiest when the distance between block and work is an integral multiple of the block width. In general, bands will appear in the flat above the upper face of the gage block. If no bands appear with the block at various distances from the ball, block and ball may be equally high. A block assembly slightly larger

The SUPER SERVICE RADIAL is acclaimed for NAVAL CONSTRUCTION

"More holes per dollar" — a statement always associated with the SUPER SERVICE RADIAL stands out to particular advantage in heavy duty drilling assignments for Naval and Merchant Shipbuilding. Note in this close-up action photograph how conveniently the operator controls the SUPER SERVICE RADIAL at the New York Shipbuilding Corporation . . . the low, centralized position of all controls at the head contributes to tangible savings in time and a great reduction in operator fatigue. The New York Shipbuilding Corporation reports not only definite savings from the use of the SUPER SERVICE RADIAL, but also "an improvement as to accuracy, speed and ease-of-handling."



AWARDED
SEPT. 10, '42

Drilling
Condenser
Head
with the
Super Service
Radial at the
New York
Shipbuilding
Corporation.

THE CINCINNATI BICKFORD TOOL CO.

OAKLEY • CINCINNATI • OHIO • U S A

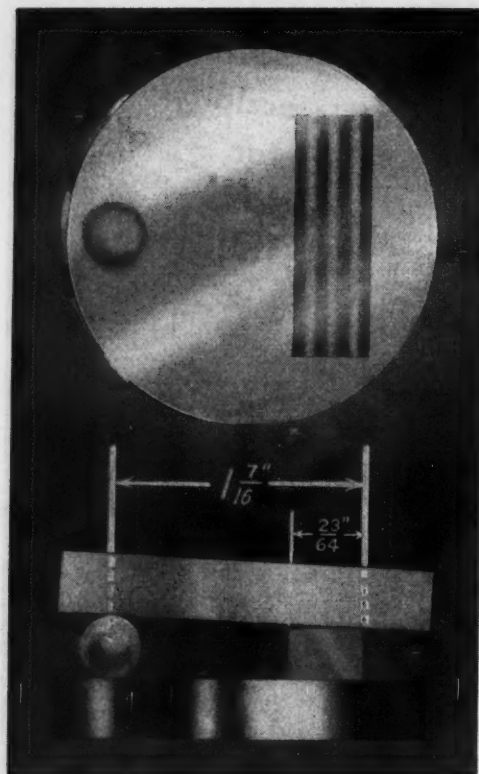


Fig. 9—Measurement of Ball Diameter. There are $3\frac{1}{2}$ bands across gage block: If the gage block surface could be continued to the center line of the ball,

there would be $\frac{17}{16} \times 3\frac{1}{2}$ or 14 bands.

Therefore, the ball is 14 bands taller than the gage block.

the distance from the right-hand edge of the block to the centerline of the ball as $1\frac{7}{8}$ inches, or four times the width of the block; therefore, in that distance there would be (if the surface of the block were continued to the ball center line) $4 \times 3\frac{1}{2}$ bands, or 14 bands. Consulting Fig. 11 on page 130, we find that 14 bands equal a height difference of 162 millionths of an inch. Therefore, the diameter of the ball is $0.250000 + 0.000162 = 0.250162$ inch.

To determine roundness, repeat the measurement at other points on the ball.

Suppose the ball had been smaller than the gage block, yet showed the same number of bands, the flat would then have been resting on the left-hand edge of the block. The distance from the centerline of the ball to the contacted edge of the block would have been $3 \times$ the width of the block. The diameter of the ball would then have been:

$$D = .250000 - (3\frac{1}{2} \times 3 \times .0000116) = .249878 \text{ inch.}$$

Figure 10 illustrates a general formula for measuring objects with gage blocks and an optical flat.

Note that the sensitivity of the set-up can be altered by simply changing the distance between the ball and the block. If the separation in Fig. 9 were halved, the number of bands on the block would be doubled. This is

or smaller should then be tried.

The bands should be fairly straight and parallel, although a slight curvature will not seriously affect the measurements. We have to determine which is higher; the block or the ball. If the block is higher, its left-hand edge will contact the glass; if it is lower, its right-hand edge will contact. In Fig. 9, pressure with the finger at the center results in the lines becoming broadened and fewer, indicating that the glass is resting on the right-hand edge of the block, and that, therefore, the ball is larger than the block.

How much larger?

The gage block is approximately $23/64$ inch wide, and there are $3\frac{1}{2}$ bands visible. But we have chosen

THE CINCINNATI SHAPER CO.

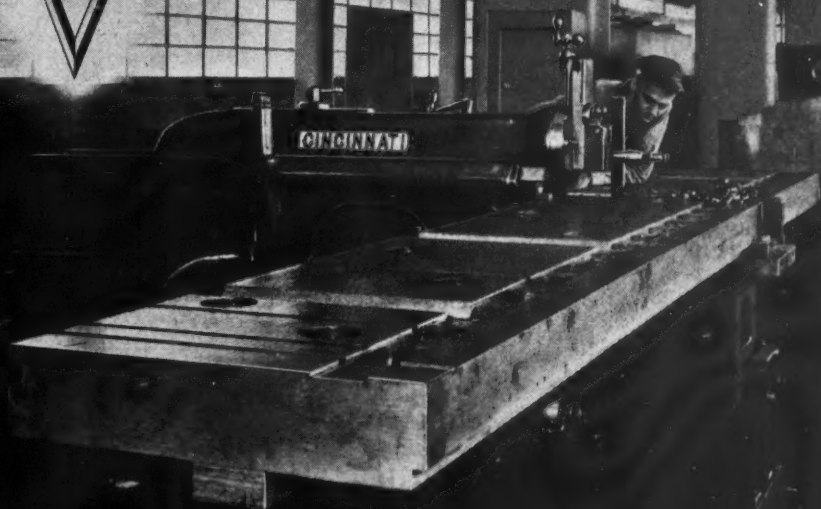
CINCINNATI OHIO U.S.A.

SHAPERS BRAKES SHEARS

Shaping a 10,000 lb. Plate

The Shaper is recognized as indispensable in the toolroom—but many manufacturing jobs are best performed on Shapers. Whether shaping slots in a 10,000-lb. plate or contouring small parts, the power and accuracy of Cincinnati Shapers will meet your requirements.

Write for Catalog N-2



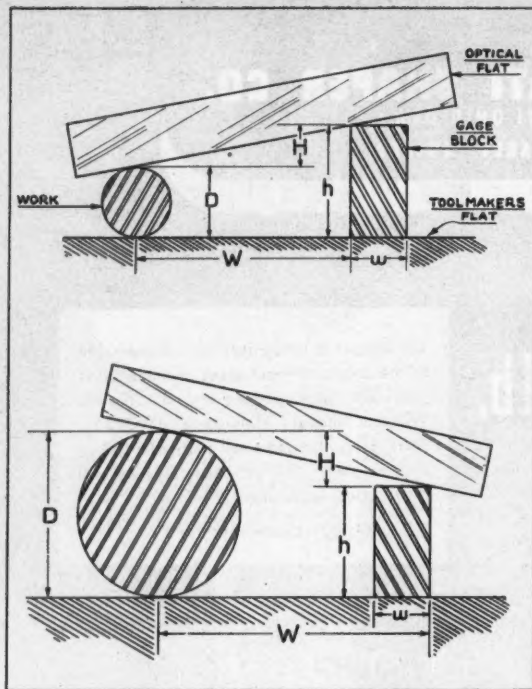


Fig. 10—General Formula for Measuring Dimensions with Optical Flat and Gage Blocks.

D = dimension to be measured

w = width of gage blocks

h = height of gage block or blocks

H = difference between height of gage blocks and dimension to be measured

W = distance between points where optical flat contacts work and gage blocks, respectively

N = number of bands across gage block face

then $H = 11.6 \times N \times \frac{W}{w}$ (in micro-inches, or millionths of an inch)

and $D = h - H$ (blocks higher than work)

or $D = h + H$ (blocks lower than work).

(To simplify calculations, always make $W = 2w, 3w, 4w,$

$5w$, etc. Then $\frac{W}{w}$ is always a whole number)

(The concluding half of this article will appear in the October issue.)

the primary consideration in choosing the distance between the ball and the gage block. There should be enough bands so they are well defined, but not so many that counting is difficult.

If many balls of the same nominal size are to be measured, it will be well to make a cardboard fixture, as shown in Fig. 11, to hold the successive balls in a constant relationship to a gage block, and at the same time carry the necessary information so that the inspector can note the diameters of the balls without much calculation.

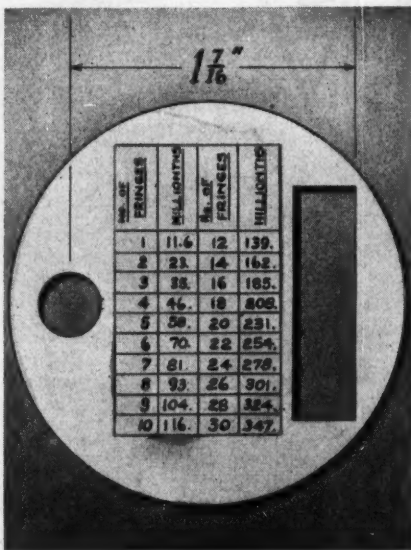
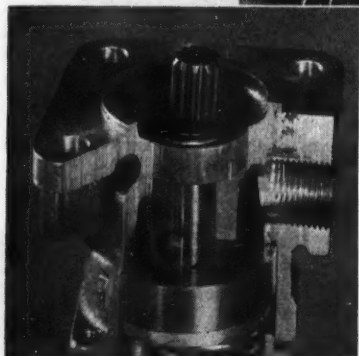


Fig. 11—A cardboard fixture carrying useful information can be used to hold block and ball in a favorable relative position.

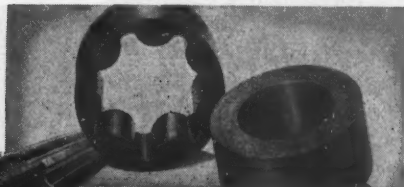
LINES BEHIND THE LINES

"PLENTY! RIGHT NOW!" IS THE AIRCRAFT INDUSTRY'S SLOGAN
—FROM PRODUCTION LINES TO FIRING LINES WITH SPEED!

Confronted with the necessity of mass production, the aircraft industry quickly sought and quickly found new methods to machine precision parts at a production rate. Broaching is becoming more and more aviation's way of meeting split second schedules.



Broaching—a better way to do many metal working jobs—is the only *right* way to do some! Cutaway view of Eaton aircraft fuel pump (left) shows distinctive rotor principle, depending for efficiency on accurate fitting.



Teeth in outer rotor are broached on a standard American hydraulic broaching machine. American broaching tools, designed specifically for the task, provide high output at economical cost. American's *complete* broaching service—machines, tools, and engineering—makes war production more efficient, post-war production more profitable.

BROACHING IS BETTER
THE *American* WAY

American
**BROACH AND
MACHINE CO.**

ANN ARBOR, MICHIGAN
BROACHING MACHINES
PRESSES
BROACHING TOOLS
SPECIAL MACHINERY





Imagine being able to secure any one of 27 spindle speeds thru only 2 conveniently placed direct reading levers without having to refer to index plates or having to retain lever positions in one's mind. Operators are enthusiastic in their praise of this new speed control. It makes their work easier; they produce more work because of it and the pay roll dollar buys more as a consequence.

1



\$

Our best Intentions



CANNOT ALWAYS PREVENT DELAYS!

We are anxious to meet your requested delivery date. When we fall short, we feel badly, too.

If our good intentions cannot prevent delays, it's because of one or more of the following:

1. We have a large backlog of orders.
2. Most of these unfilled orders are rated AA-1 priority.
3. We must schedule deliveries in accordance with priority regulations.
4. Our delivery schedules are constantly reshuffled because of old orders being re-rated, receipt of higher rated orders or revisions of priority regulations.

Honestly, we're doing our best to serve you. Please don't let "an auld acquaintance be forgot" because of an unavoidable delay. Westcott Chuck Company, 704 East Walnut Street, Oneida, N. Y. — since 1872.

WESTCOTT *Chucks*

PRECISION • DEPENDABILITY • SERVICE

Write for
Westcott Catalog
No. 550



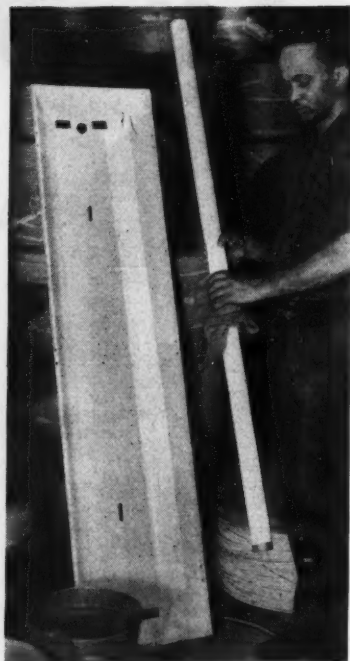


Fig. 1—Take down lamps and reflectors for cleaning at regular intervals.

Good Light Will Help Win the War

By JOHN J. NEIDHART

Engineer, Lighting Division, Westinghouse Electric
and Manufacturing Company, Cleveland, Ohio

In this article a lighting engineer presents a number of practical pointers on maintaining a high level of lighting efficiency

MAXIMUM efficiency without sacrifice of quality has always been a goal of American industry. In the past, peak efficiency has meant, primarily, greater profits and improved consumer goods at lower prices. Today, however, efficiency has taken on a new and much more important meaning, for the more quickly and efficiently our plants produce the vital *materials* needed to supply our fighting forces, the sooner we will achieve our goal—Victory.

If we examine the different methods by which productive efficiency may be increased, we soon learn that high levels of illumination of proper qual-

ity aid the workers to increase their output without additional effort. Although it is essential that the lighting installation be carefully designed in order to obtain the best results, a discussion of the installation design will be omitted from this article and, instead, we shall see what can be done to obtain optimum operating efficiency from *any* lighting installation.

Painting

A high reflection factor and matte or semi-matte surfaces are essential for maximum utilization and diffusion of light. Ceilings, walls, trusses, columns and machinery may absorb a

considerable percentage of the available light if their surfaces are not painted a light color. Dark or dirt-covered walls and equipment absorb light, whereas the light that strikes a light-colored surface is largely reflected and thus the amount of light that reaches the working plane is increased. Selection of the paint to be

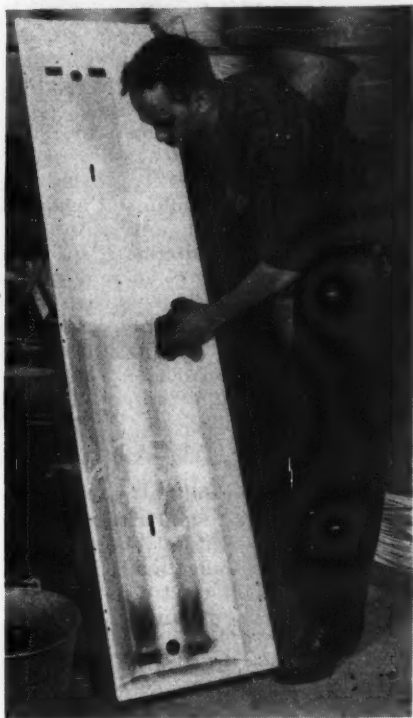


Fig. 2—Wash reflector thoroughly with soap and water.

used should be governed by the following requisites:

Reflectivity. High reflection factors lead to high efficiencies, and it is therefore desirable to paint all ceilings, walls, trusses and columns with a paint having a reflectivity of 75 per cent or better, except perhaps for a darker wainscot below the working

In War, as in Peace...

CERRO ALLOYS

Save time and cut costs!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc., and many similar applications.

Representatives and Distributors

Brooklyn, N. Y., Belmont Smelting and Refining Works

Ansonia, Conn., Jackson Associates

Boston, Mass., Jackson Associates

Philadelphia, Pa., Castaloy Metal Sales Co.

Cleveland, Ohio, Die Supply Co.

Detroit, Mich., Castaloy Metal Sales Co.

Chicago, Ill., Sterling Products Co., Inc.

Moline, Ill., Sterling Products Co., Inc.

Milwaukee, Wis., Harry C. Kettleson, Inc.

Minneapolis, Minn., Northern Machinery & Supply Co.

St. Louis, Mo., Metal Goods Corporation

Kansas City, Mo., Metal Goods Corporation

New Orleans, La., Metal Goods Corporation

Dallas, Tex., Metal Goods Corporation

Houston, Tex., Metal Goods Corporation

Los Angeles, Calif., Castaloy Metal Sales Co.

Montreal, Can., Dominion Merchants, Ltd.

London, Eng., Mining & Chem. Products, Ltd.

**Cerro De Pasco
Copper Corporation**

40 WALL ST.

NEW YORK CITY



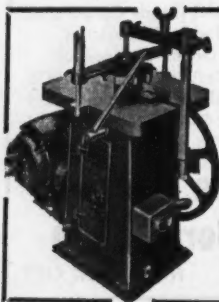
Fig. 3—Wash lamps thoroughly before replacing.

of course, by repainting or by washing.

Finish. Glossy finishes should be avoided, for the resulting specular reflections of the light sources will cause annoying glare. A matte finish is most desirable in clean areas, since it will provide for the maximum diffusion of the light and will completely eliminate specular reflections. A semi-matte or egg shell finish is usually more satisfactory, since it has a smoother surface and one which does not collect dirt as easily as does the relatively rough surface of a matte finish.

plane. Although it is not possible to maintain this high reflection factor for an extended period of time in factory areas having a dirty or oily atmosphere, the reflectivity will at all times be higher than if it had been low initially. The reflectivity can always be restored to its initial value,

by repainting or by washing. In every factory the reflectivity and appearance of the paint will eventually be impaired by dust and dirt collection. It is, therefore, advisable to select a paint which is moisture resistant and which levels out to a smooth, continuous film that is resistant to soiling and which may be washed frequently with soap and



BRAND NEW! READING TAP GRINDER

• Inexperienced workers can use the **NEW READING TAP GRINDER** on tool and cutter grinders — surface grinders—even bench lathes.

ALSO MANUFACTURERS OF READING BROACH KEYSEATER
The Reading Bench Machine does not require bushings or guides. No other machine like it. Very fast—capacity from $\frac{1}{8}$ to $\frac{3}{8}$ cutter. Low first cost—prompt delivery.

**READING MACHINE COMPANY
READING (CINCINNATI), OHIO**



**RESHARPEN
CHAMFER
EASILY!**

**Order
At Once!**

PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR

HARDINGE
ELMIRA, N.Y.



HARDINGE High Speed Precision Lathe

SPECIFICATIONS:

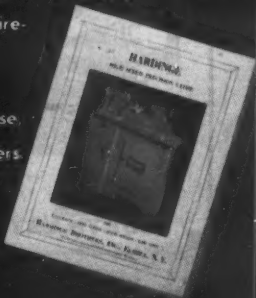
1" collet capacity, 9" swing, 17" center distance, eight spindle speeds up to 4000 R.P.M.

Designed to meet requirements of extreme lasting accuracy, high spindle speeds and the ease in operation required for the smaller diameter work range found in every tool room, laboratory and production department.

The simplicity of operation enables relatively unskilled operators to produce parts to the necessary close limits without expensive tooling. Your larger, expensive equipment will not meet all of the foregoing requirements necessary for practical results and proper economy.

Because of the many advantages found through actual use, Hardinge Precision Lathes are being installed in increasing numbers.

Ask for this 8 page bulletin which gives full details.



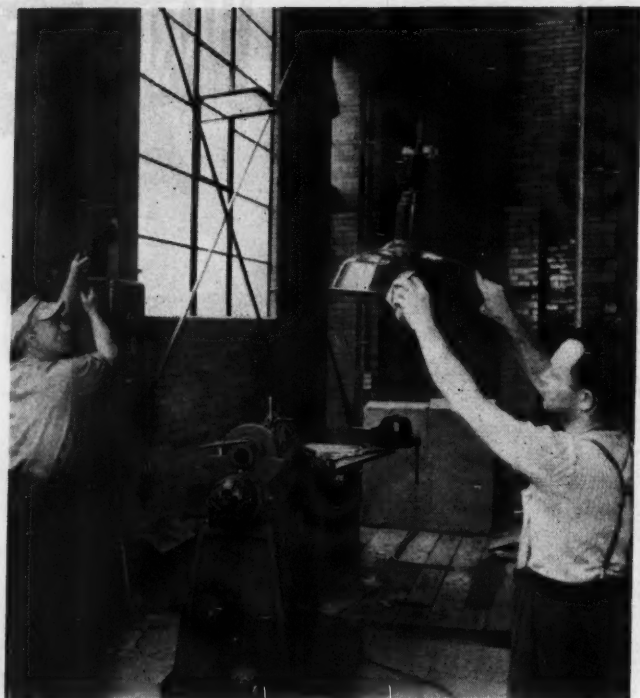


Fig. 4—Lowering a luminaire to the floor where it may be cleaned more conveniently is quickly accomplished with the aid of an automatic disconnecting hanger in this high bay area.

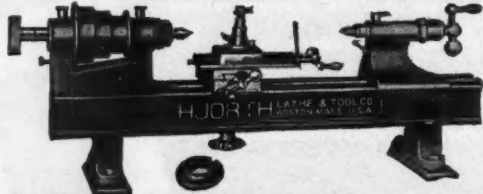
create a bright, cheerful atmosphere. White paints are often tinted slightly with blues or yellows, but tests have indicated that the natural or warm whites depreciate less with age than do the blued whites. Slightly blued whites are often the most desirable, however, when used with incandescent or 3,500 degree white fluo-

rescent lamps, since the blue tint will tend to be color-corrective and will provide a more balanced, non-chromatic white light. The machinery may be painted a medium gray, but tests have shown that visibility and safety may be enhanced by painting the working area of the machine a lighter, con-

water. If the painted surfaces are exposed to vapors and gases, special fume and moisture-resisting paint should be employed.

Color. In general, all surfaces except the machinery should be painted white, since white has a higher reflectivity than any color and helps to

... for more than 1001 odd jobs



The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

WRITE TODAY FOR DATA
AND PRICES.

HJORTH LATHE & TOOL CO., 12 BEACON ST., WOBURN, MASS.

*The Army is hollering for
these sleds—we need steel—
can you help us out?*

WE COULD . . . WE DID . . . THE SLEDs
WERE DELIVERED *on Time!*

THESE GIANT SLEDs are capable of carrying 80 tons of material—60% more than the average freight car! They were made for the U. S. Army by a Wisconsin manufacturer. By furnishing materials just when they were needed, we helped this manufacturer meet a difficult production schedule—on time!

FILLING rush orders is nothing new to us. We've been at it for years. The only difference now is that we can't fill *all* the requests all of the time. For material shortages sometimes make it impossible.

But we're in business to help you get the steels you want if it is possible to get them to you. And every man in our nine big warehouses, from the man who takes the order to the man who ships the goods, is trained to remember that our business was built upon friendly, efficient service.

Do you need steel, steel products, tools, machinery, equipment? Call us. We've filled the bill for so many wartime manufacturers that there is a good chance we can help you, too.



UNITED STATES STEEL SUPPLY COMPANY

(formerly Scully Steel Products Company)

CHICAGO (90) • BALTIMORE (3) • BOSTON (34) • CLEVELAND (14) • MILWAUKEE (1)
NEWARK, N. J. (1) • PITTSBURGH (12) • ST. LOUIS (3) • TWIN CITY (St. Paul 4)

UNITED STATES STEEL

trasting color such as buff or cream.

Advantages of Proper Painting

High-reflection-factor surfaces will increase illumination and will also provide for better diffusion of the light, minimize shadows, reduce harsh shadows between the light sources and the surroundings, improve seeing comfort and prevent the illumination from dropping near the walls or around large columns.

A worker should never be forced to look up into dark surroundings when he raises his eyes from his work, for it will have a detrimental effect upon his eyes and lead to defective eyesight. When a person shifts his eyes from a bright area to a dark one, his eyes must immediately adapt themselves to the different intensity. The eyes accomplish this by two means; (1) the pupil becomes larger to admit more light, and (2) the retina becomes more sensitive to light. When the person looks back at his work,

his eyes must go through this same procedure in reverse. Since a worker looks up rather frequently to rest his eyes by allowing them to focus on a more distant object, it is important that he look up into light surroundings.

Scientific research has shown, for example, that 12 per cent less work was done when the eyes alternated between two brightnesses, one of which was 100 times greater than the other, than when the brightness was uniform. Furthermore, light surroundings create a more cheerful atmosphere and improve worker morale, whereas dark walls and surroundings have the same effect as a dark, gloomy day and tend to depress people who work within them.

"Before and after" checks on the illumination in various factories have proved that the illumination may be increased 100 per cent or more by proper painting alone. For example, an Ohio manufacturer found that the

LENOX

FOR METAL CUTTING

There is a proper blade for every job. LENOX HACK SAWS are furnished in "MO-SPEED MOLYBDENUM," "HIGH SPEED," "SUPER-FLEX" and "STANDARD." Stocked by Distributors everywhere.

American Saw & Mfg. Co.
Springfield, Mass.

"The Blade in the Plaid Box"



INTERNAL MEASUREMENT

with

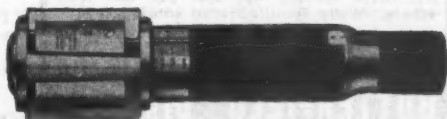
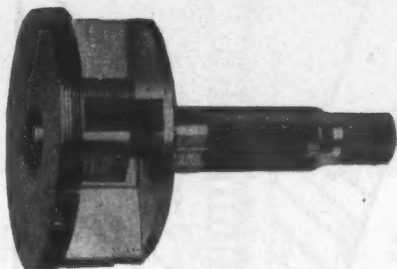
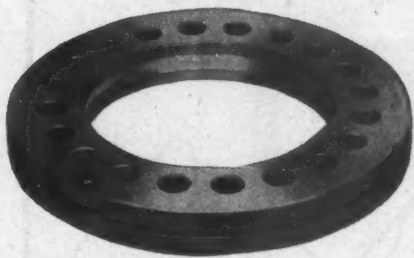
Accuracy

Today, as never before, there is a demand for dependable and time-saving measuring methods to meet the needs of war production.

Bath Super Internal Micrometers amply meet all such demands with accuracy in measuring holes—plain or threaded—to one ten-thousandths of an inch. The operator knows at any time the exact size and amount of metal left to be removed.

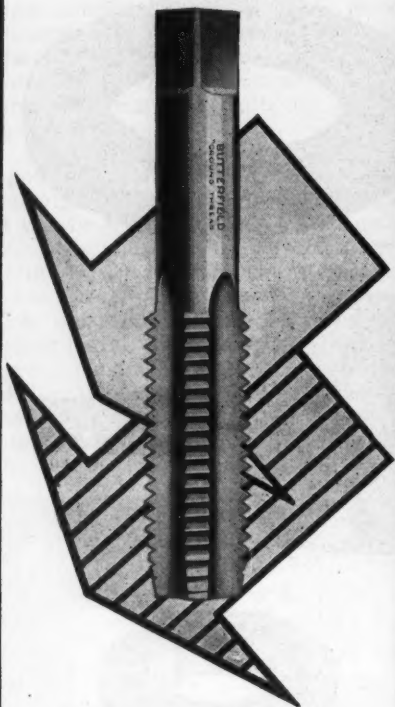
All parts of the Bath Super Internal Micrometer are accurately machined so that the assembled unit operates the measuring jaws for easy-to-read graduations on the handle.

**Write for illustrated
booklet**



John Bath & Company, Inc.
WORCESTER MASS.

BUTTERFIELD TAPS



ANY TYPE—ANY SIZE—ANY SERVICE

You can get any kind or size tap you need from Butterfield. Considering quality of materials, workmanship, precision and durability, these famous taps cost you less than others. Write for illustrated catalog.

UNION TWIST DRILL CO. BUTTERFIELD DIVISION

Factories: DERBY LINE, VERMONT, U. S. A.
Athol, Mass.; Mansfield, Mass.;
Rock Island, Quebec, Can.

STORES:

Cleveland	3346 Superior Ave.
Chicago	11 S. Clinton St.
Detroit	6540 Antoine St.
New York	61 Rensselaer St.

illumination in his factory was increased from 5 footcandles to 15 footcandles by merely repainting all interior surfaces to prevent light absorption. Benefits resulting from such an increase in illumination become even more significant when one considers that it does not include the more intangible benefits of better dif-

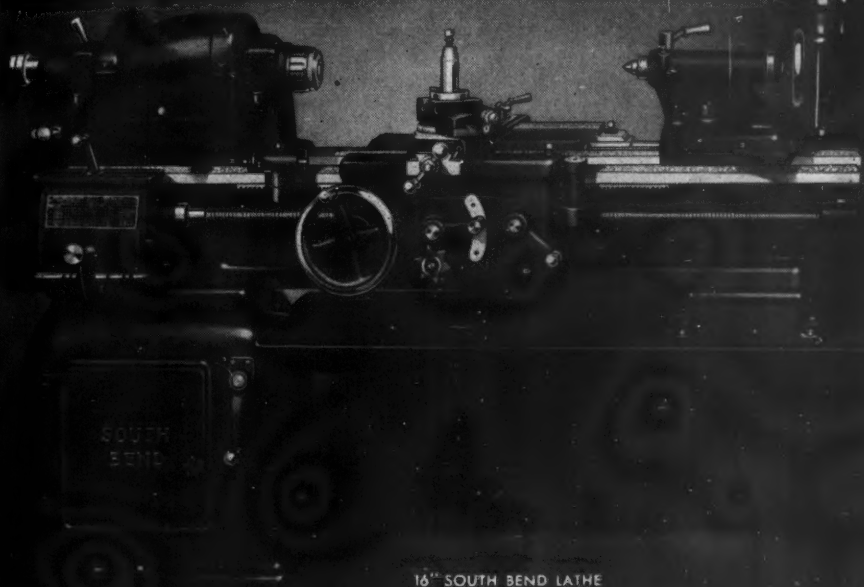


Fig. 5—Removable reflectors make it possible for the maintenance man to remove a dirty reflector and replace it with a clean one that is carried as an extra. He then washes the dirty reflector on the floor and repeats the procedure at the next luminaire replacing the dirty reflector with the one he has just washed. This saves him one trip up and down the ladder at each luminaire.

fusion and improved seeing comfort.

Maintenance

Maintenance departments of all factories should devote special attention to the care of lighting installations. Planned maintenance will assure peak efficiency and prolong the useful life of the lighting equipment. The best 50-footcandle installation is no better than a comparable 20-footcandle in-



16" SOUTH BEND LATHE

SOUTH BEND LATHES FOR UNIFORM ACCURACY

SPECIFICATIONS of 16" lathe

Swing over bed 16 $\frac{1}{4}$ "
 Distance between centers. 33 $\frac{1}{2}$ "
 Maximum collet capacity. . 1"
 Thread cutting feeds (48).
 4 to 224 per inch
 Spindle Speeds (8)
 21 to 725 r.p.m.
 Power longitudinal and cross
 feeds 48

BUY WAR BONDS



War production demands uniform accuracy. Loss of time or the waste of scarce strategic materials because of variations in machining cannot be tolerated. There is no place in our war production plan for equipment that cannot be relied upon to maintain required tolerances.

Sound design and careful workmanship give South Bend Lathes the dependable precision that assures uniform accuracy and speeds production on the most exacting machine operations.

South Bend Engine Lathes and Toolroom Lathes are made with 9", 10", 13", 14 $\frac{1}{2}$ ", and 16" swings. The turret lathes are made with 9" and 10" swings. Write for Catalog 100-C in which they are all described.

TRAINING HELPS—Sound films, books, wall charts and bulletins are available for training lathe operators. Write for Bulletin 21-C.



SOUTH BEND LATHE WORKS
 LATHE BUILDERS FOR 36 YEARS • SOUTH BEND 22, INDIANA



Fig. 6—High reflection factor, white surfaces help diffuse the light and improve the efficiency of the fluorescent installation in this manufacturing and repair shop.

stallation if burned out lamps are not replaced and the reflectors are allowed to remain dirty, reducing illumination to a fraction of its designed maintained value.

A well-planned maintenance program divides itself into two phases: (1) the **cleaning** of the lighting equipment and reflecting surfaces to remove dust and dirt, and (2) the **re-lamping** of the luminaires immediately after lamp burnouts or on a systematic lamp replacement plan.

Cleaning. The permissible elapse of time between cleanings is peculiar to each installation, since the rate of de-

crease in light-output varies with the type of lighting equipment and the amount of dust and dirt in the air. Dust-tight covers will simplify the maintenance problem considerably in extremely dirty atmospheres such as are prevalent in foundries.

The best methods of establishing a cleaning schedule for any installation is to make periodic checks of the illumination with a light meter. The length of time required for the illumination to drop to approximately two-thirds of its initial value may be arbitrarily taken as a satisfactory cleaning period in most cases. This period

"PUT ON THE PRESSURE AND SPOIL THE FILE," SAYS POP



UNAVOIDABLE as they are, wastes on the battle fronts are terrific. They make it all the more necessary to *prevent* wastes on the home fronts.

In no other shop tools can there be a heavier percentage of steel wastage through *misuse* than in files. Nor more serviceable life added by *proper* use, proper care and proper selection of *The right file for the job*.

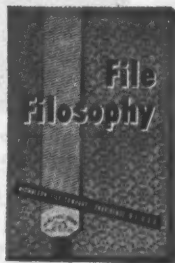
Too much hand pressure is the commonest filing fault. Consequently, too much "pressure" can scarcely be exerted by foremen toward keeping workmen out of this wasteful habit.

The superior cutting and lasting qualities built into Nicholson and Black Diamond Files will prove that it pays

to specify these world-famous brands. To help bring out the proof, Nicholson offers industrial managements this book:

"FILE PHILOSOPHY"—FREE

The most authoritative book of its kind! Understandably written and profusely illustrated, "File Philosophy" is a most valuable hand-book. It describes the more widely used regular and special purpose files, and is particularly helpful in training the less-experienced worker in proper file use, care and selection. Available for the asking—for purchasing and production heads, foremen, key mechanics.



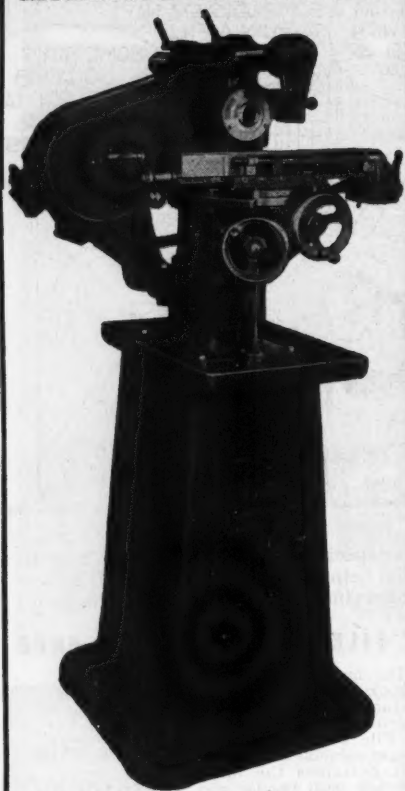
NICHOLSON FILE COMPANY • 48 ACORN STREET, PROVIDENCE 1, R. I., U. S. A.

(Also Canadian Plant, Port Hope, Ont.)

NICHOLSON FILES FOR EVERY PURPOSE



BURKE MILLING MACHINES



No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

Write for complete information.

BURKE MACHINE TOOL CO.
297 E. 16th St. Conneaut, Ohio

may be as short as 3 or 4 weeks in extremely dirty locations, but it will usually be from 2 to 6 months under average conditions.

When luminaires are cleaned, all reflecting surfaces and glass covers should be thoroughly washed with soap and warm water. Merely wiping off the reflector or glass with a dry cloth is not only insufficient but is also apt to shorten the life of the reflector. Greasy dirt and grime which remains after several dry wipings will tend to form a permanent coating which cannot be removed.

Relamping. The rated life of a lamp is the average life of a large number of lamps and cannot be considered as a guarantee of the life of any one lamp. Many lamps will have much shorter lives than the rated hours, but an equal number will burn longer than the rated hours. The lamps will, therefore, burn out at sporadic intervals with the maximum number of burnouts occurring at or near multiples of the rated life. Burned-out lamps may either be replaced as burnouts occur, or on a group replacement plan.

The group replacement plan has the advantage that it may be combined with the cleaning program by arranging the cleaning schedule so that the lamps will be approaching the end of life at some even multiple of the period between cleanings. At that particular cleaning, which may be somewhere between 80 per cent and 90 per cent of normal lamp life, the entire installation is relamped and the system is restored to practically its initial efficiency. The old, blackened lamps which are close to the end of life may be discarded, but those showing signs of further useful life are set aside to replace the few early burnouts which will occur in the next group of lamps.

Such a plan will materially reduce the labor cost of lamp replacement, since there will be less wasted effort



The cutter head has universal adjustments and power rapid traverse automatically moves the cutter to the work when the machine is started and retracts it when the work is finished.

The Universal Cross handles all kinds of spur, spiral, helical and herringbone gears or splines—both internal and external.

A Universal Gear Chamfering Machine for producing any form on internal and external gear teeth with a "pencil-point" cutter. Spur, helical, herringbone or, gears with relieved teeth are all chamfered with equal ease. Can be tooled economically for quick set-up and automatic operation.

Literature upon Request.

CROSS GEAR & MACHINE CO.

Established in 1898

DETROIT MICHIGAN U.S.A.



Fig. 7—Visibility and lighting efficiency are greatly enhanced by the white ceiling and columns in the machine shop shown here.

and setup time required when all the lamps are changed at once. Also, the additional labor required for relamping the luminaires as they are cleaned will be almost negligible.

Maintenance Methods—In low bay areas, lighting equipment can usually be maintained from step ladders, but higher bays present more of a problem. In some plants the fixtures can be cleaned and relamped from a traveling crane, but it is frequently undesirable to tie the crane up for this work. Movable telescoping platform lifts are quite satisfactory in areas where the presence of machinery does not interfere with their use.

One of the most convenient means of access to the luminaires is from catwalks, but the installation cost is high and they are feasible only on special application where all of the fixtures may be mounted on a few catwalks. Automatic disconnecting

hangers which permit the luminaires to be lowered to the floor by chains or ropes offer another convenient means of facilitating maintenance. A monorail system provides another quick and easy method of servicing the lighting equipment from traveling platforms or cars and is frequently used for large fluorescent installations.

Disconnecting-type hangers or reflectors that are easily removed usually simplify the maintenance problem considerably, since the reflectors may be washed by one man on the floor or platform while a fellow worker removes the dirty reflectors from the luminaires and replaces them with clean ones.

Results of Proper Maintenance

The importance of regular servicing of lighting equipment is strikingly illustrated by the results of tests con-

MAINTENANCE POINTERS

FROM AIR O'TOOL

A Little Gadget—but



LOOK WHAT IT FEEDS HITLER

THE AIR STRAINER

—How it Works



The Air Strainer in the handle of your Rotor Air Tool has a screen which keeps all foreign matter and pipe scale out of the working parts of the tool. This screen should be examined weekly and, if dirty, should be blown out or washed out. If damaged, it should be replaced with a new one—available at nominal cost. The strainer is easily disassembled. See above sketch.

THE Strainer in the handle of your AIR tool may be a little gadget in size but it's mighty important in deed when it comes to speeding the day of doom for Hitler & Co.

Look what it keeps out of the tool. Look at a grain of dirt under a microscope. Those sharp edges eat away critical tool life and cut down vital production.

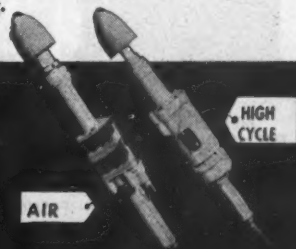


Grain of dust through a microscope.

Take good care of that little strainer and the other elements in your AIR system that keep your tools clean and powerful. Help make the Axis bite the dust!

A full discussion of AIR supply and 10 other subjects are given in the Rotor Maintenance manual, "Keep 'em Running". You should have this guide—also the handy wall chart which gives the salient points. A similar set of aids is available on HIGH-CYCLE tools. Yours for the asking ... and the using.

THE ROTOR TOOL CO.
CLEVELAND, OHIO



ducted to determine the actual loss in illumination due to dirt collection on lamps and luminaires. In one case, a porcelain-enameled reflector for a fluorescent luminaire was removed from an average factory area and tested for light output in a photometric laboratory. Light output was checked during various stages of cleaning and results were tabulated as follows:

- (1) Dirty reflector and dirty lamp—
22.8 per cent decrease in light output
- (2) Dirty reflector and clean lamp—
18.1 per cent decrease in light output
- (3) Reflector wiped with dry cloth—
6.2 per cent decrease in light output
- (4) Reflector and lamps washed—
0 per cent decrease in light output

This reflector had not been serviced for approximately 6 months; if the period had been longer, the amount of

light being wasted would have been even larger. Another laboratory test on two high-bay reflectors yielded the following results:

A. Open High Bay Reflector from average factory area

- (1) As found—42 per cent decrease in light output
- (2) Dry wiped—35 per cent decrease in light output
- (3) Washed clean—0 per cent decrease in light output

B. Enclosed Dust Tight High Bay Reflector from foundry

- (1) As found—7 per cent decrease in light output
- (2) Dry wiped—5 per cent decrease in light output
- (3) Washed clean—0 per cent decrease in light output

The length of time since the last cleaning of both A and B above was over a year.

The tests not only illustrate how much light may be wasted through neglect but also show two other interesting points. First, it is evident that dry wiping is entirely unsatisfactory for cleaning. The degree of ineffectiveness of dry wiping depends upon the character and oiliness of the dirt and the nature of the reflecting surface, but in no case is it adequate. Second, the comparison between A and B proves the economy of dust tight covers in extremely dirty locations, for B was in a much dirtier atmosphere than was A. In any case, whether the dirt be prevented from reaching the reflecting surfaces or whether these surfaces are kept at optimum efficiency by frequent washing, it is obvious that it pays to keep lighting equipment clean.

HAMILTON

SWISS TYPE

GEAR HOBBERS



...for accuracy
and speed in
hobbing
PINIONS,
GEARS and
SECTORS.

TWO MODELS

No. 00 SPUR GEAR
HOBBER for work
up to 2" dia.

No. 1 SPUR and
SPIRAL GEAR HOB-
BER (Illustrated)
for work up to 6"
dia.

Write for further
details to

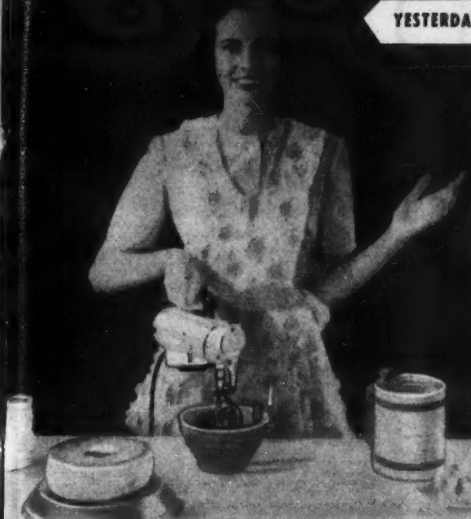
**TRIPLEX MACHINE
TOOL CORP.**

Manufactured by
THE HAMILTON TOOL CO.
Hamilton, Ohio

Exclusive Sales Agents
125 Barclay St.,
New York 7, N. Y.

SAVE HOURS OF TRAINING for your Screw Driving Army

YESTERDAY . . . TODAY



PHILLIPS SCREWS ARE FOOL-PROOF!

Light-fingered and feminine . . . heavy-handed and he-man . . . raw recruit or veteran. All can be put on a high-production level on your assembly line by giving them Phillips Recessed Head Screws.

The scientifically designed Phillips Recess automatically centers the driving force and eliminates all driving troubles . . . fumbling, wobbly starts . . . slant-driven screws . . . burred and broken screw

heads . . . and dangerous screw driver skids.

Screw and driver "become one unit", making such efficient use of turning power that driving is much easier and faster, regardless of driving method. And, power driving is made practical in most cases.

They cost less to use! Compare the cost of driving Phillips and slotted head screws. You'll find that the price of screws is a minor item in your total fastening expense . . . that it actually costs less to have the advantages of the Phillips Recess!

KEY TO FASTENING SPEED AND SAFETY

The Phillips Recessed Head was scientifically engineered to afford:

Fast Starting—Driver point automatically centers in the recess . . . its snugly. Screw and driver "become one unit." Fumbling, wobbly starts are eliminated.

Faster Driving—Spiral and power driving are made practical. Driver won't slip out of recess to injure workers or spoil material. (Average time saving is 50%.)

Faster Driving—Turning power is fully utilized by automatic centering of driver in screw head. Workers maintain speed without tiring.

Better Fastenings—Screws are set-up uniformly tight, without burring or breaking heads. A stronger, neater job results.



PHILLIPS *Recessed Head* SCREWS

WOOD SCREWS • MACHINE SCREWS • SELF-TAPPING SCREWS • STOVE BOLTS

21 SOURCES

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Control Screw Co., Chicago, Ill.
Crescent Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
The H. M. Harper Co., Chicago, Ill.

International Screw Co., Detroit, Mich.
The Lumsden & Senison Co., Cleveland, O.
The National Screw & Mfg. Co., Cleveland, O.
New England Screw Co., Keosau, N. H.
The Charles Parker Co., Meriden, Conn.
Parson-Rakon Corp., New York, N. Y.
Prestolite Screw Co., Piquette, R. I.

Pinell Manufacturing Co., Chicago, Ill.
Reading Screw Co., Hamtown, Pa.
Russell Bantall & Ward Bolt & Nut Co., Port Chester, N. Y.
Sawall Manufacturing Co., Waterbury, Conn.
Shelton Corp., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N. H.

THIS



*Half a century of specialization has established our reputation as the small wheel people of the abrasive industry.

☐ B
☐ C
☐ F
☐ A
☐ G

IS THE WHEEL* MR. JONES

● Maybe you were stumped by grinding jobs before, but they won't worry you any more.

300 shapes and sizes—every grade and grain—there is a Chicago Mounted Wheel custom-built to take on any grinding problem. Each wheel is a whirling point of power that turns your jobs out smooth—and in a hurry.

PROMPT DELIVERY

Action is the keynote from the moment your order comes in. Our wartime set-up concentrates on mounted points and grinding wheels 3" in diameter and under.—Production is stepped up and keeps pace with demand. Another advantage to you is our central location.

TEST WHEEL FREE—Tell us the job, type grinder and size wheel you would like to try and we will gladly send one prepaid.

NEW CATALOG—Shows Chicago Mounted Wheels in actual colors, also portable electric tools and time-saving accessories.

CHICAGO WHEEL & MFG. COMPANY

America's Headquarters for Mounted Wheels and Small Grinding Wheels

1101 W. Monroe St., Dept. MM

Chicago 7, Illinois

☐ Send Mounted Wheel Catalog

MM-

☐ Free Wheel, Size.....

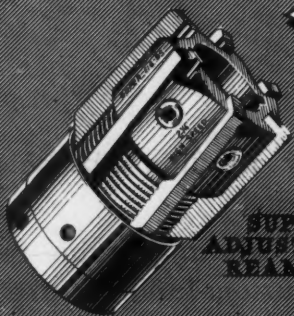
Name.....

☐ Also interested in Grinding Wheels

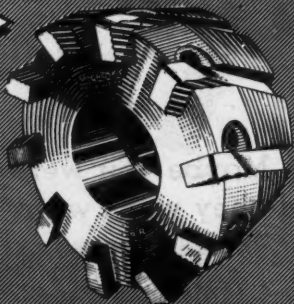
Address.....

The **MC CROSKY** *Line*

**COST
CUTTING
TOOLS**



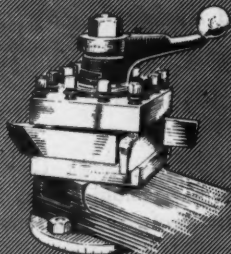
**SUPER
ADJUSTABLE
REAMERS**



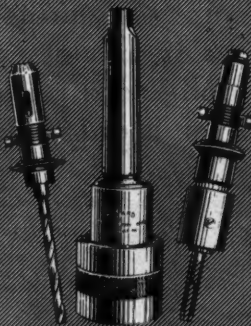
**JACK-LOCK
MILLING CUTTERS**



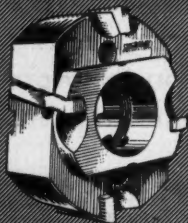
ADJUSTABLE BLOCK BORING BARS



**TURRET
TOOL POSTS**



**WIZARD
QUICK-CHANGE CHUCKS**



**SPECIAL
PURPOSE
CUTTING
TOOLS**

MC CROSKY TOOL CORPORATION

ESTABLISHED 1904 • MEADVILLE, PENNSYLVANIA.

Bulletins, manuals and engineering data sheets are available for various units in the McCrosky line of metal-cutting tools and machine-tool attachments.

ASK FOR THEM BY UNIT NAME.



Official U. S. Army Signal Corps Photograph

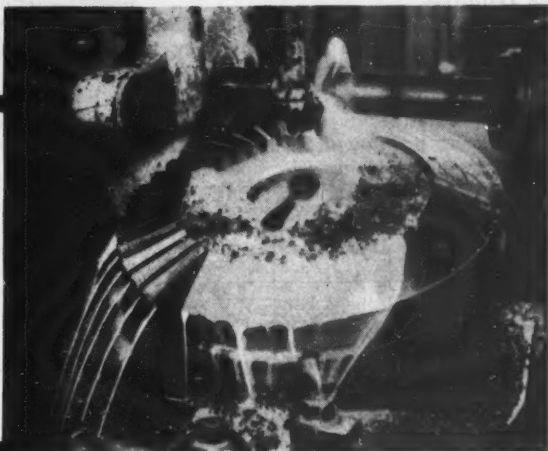
DECISIVE POWER

demands utmost *productive* power. To maintain top efficiency in MACHINING use . . .

... SINCLAIR CUTTING OILS and COOLANTS.

For the great variety of metals and operations requiring individual treatment Sinclair provides a diversified line of specialized oils adapted to every problem.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.

How To Grind Carbide Form Tools

THE tremendous increase in the use of cemented carbide cutting tools has brought with it the need for specialized training in the grinding of form tools made of this and like materials.

Speaking from our own experience, many companies today purchase standardized Carboloy tools, available in mass production, and grind these in their own tool-rooms to special forms as required.

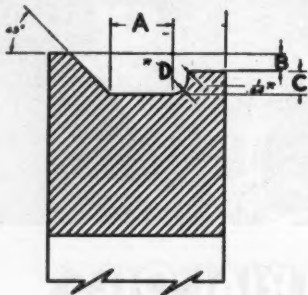
The grinding of such specialized forms presents no great difficulty to the experienced operator, but the extreme hardness of carbides does involve a change in grinding practice from that employed in the grinding of form tools from high speed steel.

A better understanding of the prin-

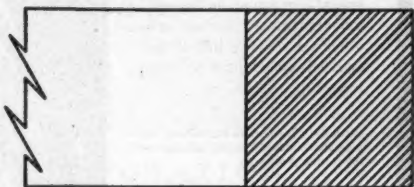
ciples involved in actual grinding operations on carbide tools may be acquired perhaps by studying the accompanying illustrations. The figure at the head of the article shows an imaginary form tool, the design of which incorporates specifications combining virtually all grinding problems encountered in the preparation of form tools. The design was developed for "training" purposes at the school for carbide supervisors operated at the plant of the Carboloy Company, at Detroit.

It is, of course, a more complicated "tool" than usually would be encountered in actual practice.

With the drawing of the imaginary form tool is shown a standard Carboloy style T-17 tool from which the



Dimensions A to D to be held to close limits.



Carboloy Style T-17

Imaginary Form Tool Combining Virtually All Carbide Grinding Problems When Making Form Tools from Standard Carbide Tools Such as the Style T-17

**A simple set-up for
small-lot stamping
operations**



*At a plant of Wright
Aeronautical Corporation:
Hannifin 35-ton
hydraulic press
stamping baffles.*

This Hannifin hydraulic press

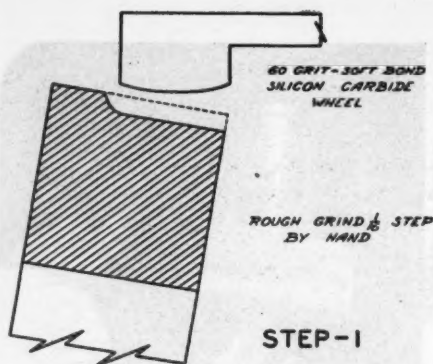
is an example of a press ideally adapted to a wide range of assembly, forming, or stamping work with simple set-up and fast, convenient operation. Gap, reach, and table dimensions are ample for convenient handling of a variety of work. Maximum pressure is adjustable and ram stroke is adjustable, providing correct working pressure and avoiding unnecessary up-travel of the ram. Simple hand lever or foot pedal control can be provided.

Hannifin hydraulic presses are built in a wide range of standard types, capacities 5 tons to 200 tons, for straightening, forming, press-assembly, and similar work. Modifications can be readily made to provide reach, gap, stroke and table design suited to individual operating needs. Hannifin engineers will gladly furnish specific recommendations.

HANNIFIN MANUFACTURING CO.

621-631 South Kolmar Avenue
Chicago 24, Illinois

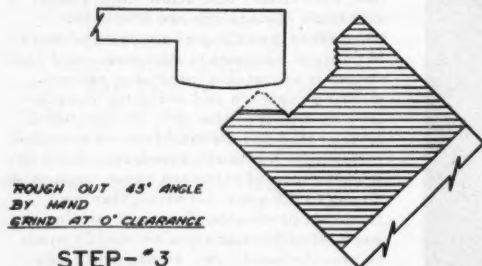
HANNIFIN
Hydraulic **PRESSES**



STEP-1

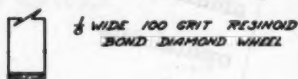
"form tool" is to be produced. The following "steps" illustrate the order and manner in which grinding operations are to be performed.

60 GRIT - SOFT BOND
SILICON CARBIDE WHEEL



STEP-3

Step No. 1 shows the preliminary rough hand grinding to establish dimension B approximately. In step No. 2, the two surfaces "a" and "b" are first semi-finish ground to establish dimension "B." The next operation is to rough out the material in the center to approximate dimensions "A" and "C." The central portion is first hogged out and then additional material is removed by plunge grinding to prepare for grinding radius



STEP-2

- (a) SET UP ON SURFACE GRINDER FOR 7" CLEARANCE. GRIND THIS SURFACE TO CLEAN UP
- (b) FEED DOWN TO ESTABLISH THIS STEP
- (c) FEED DOWN MORE TO THIS STEP ALLOW .005 FINISHING STOCK ON SURFACES A & B
- (d) RAISE WHEEL AND PLUNGE CUT A SERIES OF SMALL STEPS TO APPROXIMATE A 1/8 RADIUS. DO NOT SIDE WHEEL TO GRIND THESE STEPS, AS THIS IS HARD ON DIAMOND WHEEL

"D."

If the 45 deg. angle shown in the first figure is to be included, this is now also roughed out as shown in step No. 3. Step No. 4 shows the manner in which radius "D" should

REYNOLDS Coolant Units for Machine Tools

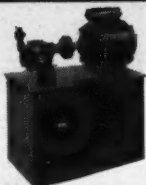


No. 206 (left) Approximately 15 gal. capacity P.M. Tank 20" x 16" x 16". 1/4 H.P. motor. For grinding machines, multiple spindle drills. \$95.00 each for the 110 volt 1 phase model, and 220 volt, 3 phase model. \$112.00 for

"KEEP 'EM COOLER IN ACTION"

the 550 volt, 3 phase model.

No. 1-s (right) Approximately 7 gal. capacity P.M. 16" x 10" x 11" tank. 1/4 H.P. motor. For Milling and Screw Machines, Lathes, etc. \$98.50 each for 110 volt 1 phase model, and 220 volt, 3 phase model. 550 volt, 3 phase model, \$108.50.

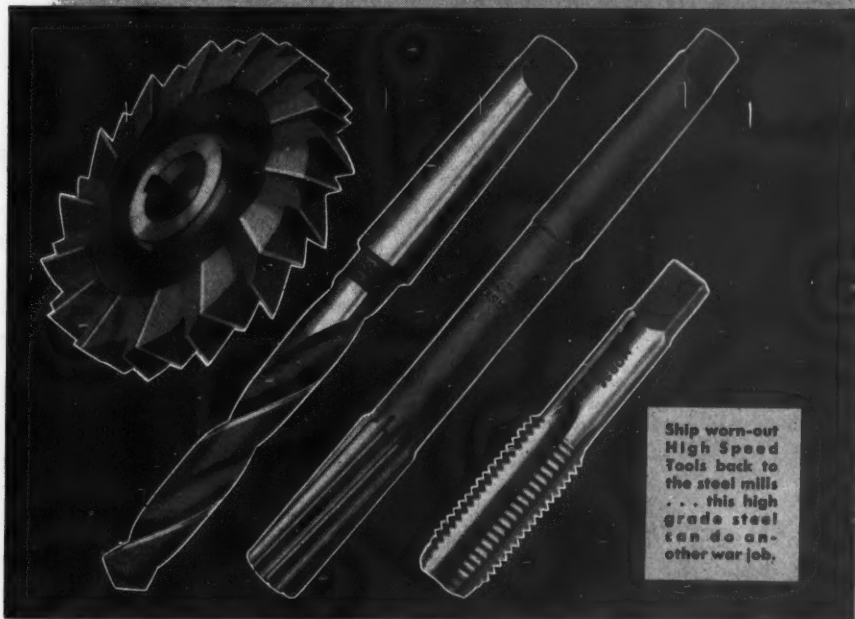


REYNOLDS MACHINERY CO., 211 EDDY ST., PROVIDENCE, R. I.

TOOLS MUST BE ABLE TO TAKE IT, TOO!



• Only quality cutting tools have the stamina to stand up under today's heavy production schedules. Use MORSE Tools — tools that can take it!



Ship worn-out High Speed Tools back to the steel mills . . . this high grade steel can do another war job.

MORSE

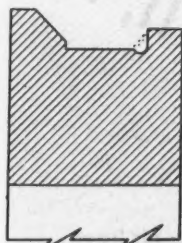
THERE IS A DIFFERENCE

TWIST DRILL AND MACHINE COMPANY
NEW BEDFORD, MASS., U. S. A.

NEW YORK STORE: 130 LAFAYETTE ST. . . . CHICAGO STORE: 370 WEST RANDOLPH ST.

$\frac{1}{8}$ OR $\frac{1}{4}$ WIDE 80 GRIT-SOFT BOND SILICON CARBIDE WHEEL

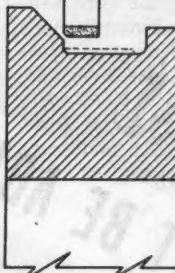
STEP-# 4



FINISH RADIUS BY HAND-LAPPING WITH $\frac{1}{8}$ DIA COLD ROLLED STEEL ROD AND #4 DIAMOND POWDER

SET UP ON SURFACE GRINDER, AS IN OPERATION "C", ROUGH GRIND RADIUS FORM RADIUS ON WHEEL BY HAND.

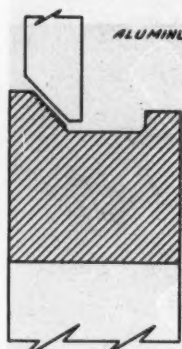
$\frac{1}{8}$ WIDE 180 OR 220 GRIT RESINOID BOND DIAMOND WHEEL



WITH TOOL SET TO GIVE 7° CLEARANCE, GRIND BOTTOM STEP TO BLEND WITH RADIUS ALSO ESTABLISH 45° ANGLE, HOLDING BOTTOM OF GROOVE TO CORRECT WIDTH TO DO THIS DRESS CHAMFER ON CORNER OF DIAMOND WHEEL

STEP-# 5

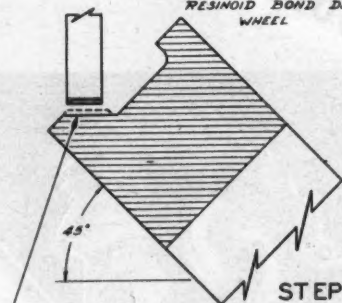
ALUMINUM OXIDE WHEEL



TO ESTABLISH CLEARANCE TO GIVE A FORM GRIND ON 45° ANGLE, SET TOOL TO GIVE 7° CLEARANCE ON BOTTOM OF GROOVE. GRIND WITH ALUMINUM OXIDE WHEEL DRESSED AT 45° DO NOT GRIND CARBIDE. CONTACT STEEL ONLY

STEP-# 6

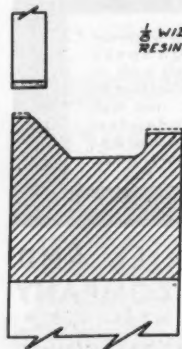
$\frac{1}{8}$ WIDE 180 OR 220 GRIT RESINOID BOND DIAMOND WHEEL



SET UP TOOL IN GRINDING FIXTURE AT 45° TILT FIXTURE UNTIL SURFACE WHICH WAS GRIND IN OPER "C" INDICATES HORIZONTAL, SWING FIXTURE ON MAGNETIC CHUCK UNTIL BOTTOM OF GROOVE INDICATES PARALLEL WITH TABLE TRANSVERSE GRIND TO BLEND WITH SMALL SECTION ESTABLISHED IN OPER "5"

STEP-7

$\frac{1}{8}$ WIDE 180 OR 220 GRIT RESINOID BOND DIAMOND WHEEL



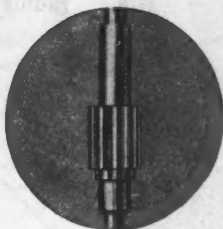
SET UP FOR 7° CLEARANCE AND GRIND STEPS TO SIZE

STEP-# 8

be semi-finished and finished. Note that this radius is completed before grinding to the full depth "C." The latter is now performed as shown in step No. 5, blending the surface with the radius.

The steel shank below the angle is now ground to the proper clearance as shown in step No. 6, using an aluminum oxide wheel, taking care not to touch the carbide with this wheel. Step No. 7 shows the manner

THREE DIMENSIONAL VISION *Simplifies Inspection Work*



**As seen through
the microscope**

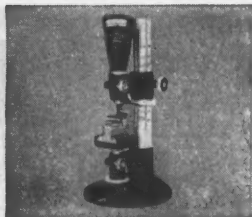
Price \$143.50

The Spencer Binocular Microscope extends and improves the quality and precision of your inspection work. It simplifies the examination of raw and finished materials for surface flaws and irregularities.

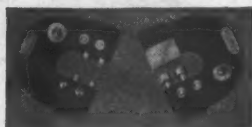
CONSIDER THESE OUTSTANDING ADVANTAGES

- Use of both eyes without strain or fatigue.
- Unusual brilliance and sharpness of image.
- Large field of view and long working distance.
- Distance between oculars adjustable to individual requirements.
- Full stereoscopic appearance of the object makes fine scratches and defects stand out distinctly.
- Different magnifications available to suit your particular problems.

YOUR INSPECTION DEPARTMENT IS NOT COMPLETE WITHOUT THIS BINOCULAR MICROSCOPE. WRITE TODAY FOR COMPLETE LITERATURE AND QUOTATION.



SCHERR COMPARITOL—for checking gage blocks, gages and work for size, accuracy and wear. \$195.00



ATLANTIC ADJUSTABLE LIMIT SNAP GAGES—for accurate check-up, without having to depend on operator's skill. Sizes to 6".



MAGNI-RAY—a wide field illuminated magnifier for close inspection of work and operations. \$18.50 List.



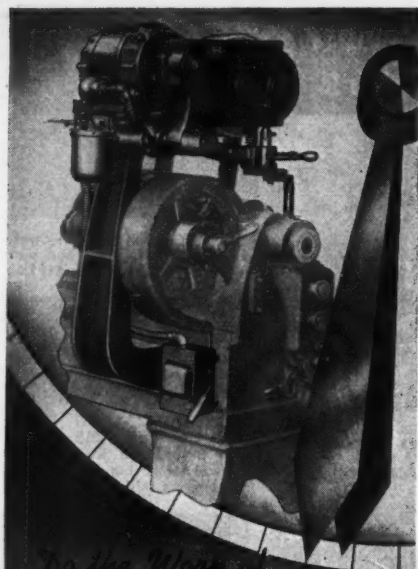
SPENCER BINOCULARS — for detecting surface finish, imperfections, etc., by means of 3-dimensional vision. \$143.50.



WILDER PROJECTOR provides accurate measuring or comparison of objects by means of magnified shadow.

GEORGE SCHERR COMPANY, INC.

130 LAFAYETTE ST.,
NEW YORK, N. Y.



Do the Work of
12 Hours in 9 with
CULLMAN DRIVES

With the ever-increasing demand for faster delivery it is vitally important to get maximum production from every machine and man-hour.

Cullman Drives will modernize shaft and belt driven lathes, screw machines, shapers, and similar equipment to give an increased output of more than 25%.

Cullman Drives give individual machine control, have greater flexibility, and are safer in operation than overhead line shaft drives. They permit the utmost in efficient arrangement for work flow and lighting.

Cullman Drives are sturdy and built for long life. They operate with belt-drive smoothness. They are easy to install and economical to buy. They are built for motors from 1/4 to 15 H.P. Prompt delivery can be made on most sizes.

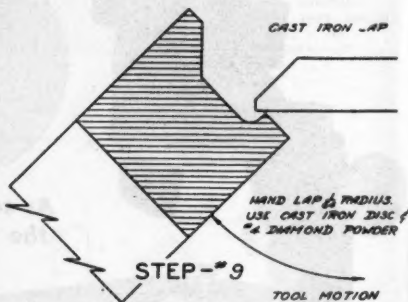
Write for full information on Cullman Drives and the 60 day trial plan.

CULLMAN WHEEL COMPANY

1352-V Altgeld St., Chicago, Ill.

in which the angle is now finish ground.

With the groove properly established, surfaces "a" and "b" at the end of dimension "B" can be finished as in step No. 8. Final operation is the hand lapping of the small external radius as shown in No. 9.



By following these sequences and methods of grinding, the great majority of form tools can be readily ground, omitting those steps which do not pertain to the particular tool form to be produced.

WHY YOU HAVEN'T GOT IT

A pint of glycerine goes into the making of a pound of nitroglycerine. Nylon that would make 36 pairs of stockings is needed for the shroud lines of one parachute. A pint of alcohol goes into the making of 1/2 pound of smokeless powder.

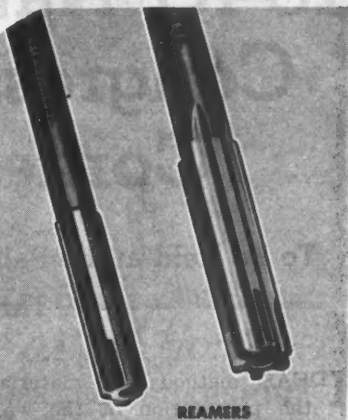
The steel in a complete set of golf clubs would be sufficient for 30 hand grenades. The alcohol equivalent of a pound of sugar would give our boys 47 shots at the Japs. A fully-loaded Flying Fortress uses as much gasoline in an hour as the average citizen's automobile does in 6 months.

Victory Bonds bought now will save you from a slave's bonds later.

NEW ENGLAND

New England form tools, reamers, boring tools, centers, etc. are tipped with any make or grade of carbide specified by you; precision ground on diamond wheels; then checked and double checked on the latest type of contour inspection equipment. They are made to your specifications—exactly! Thus you can expect, and get, long life with highest accuracy. We will be pleased to arrange production schedules to supply your standard and special tooling requirements.

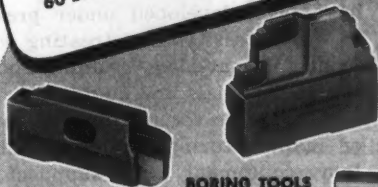
NEW ENGLAND CARBIDE TOOL CO.
60 BROOKLINE STREET, CAMBRIDGE, MASS.



REAMERS



CENTERS

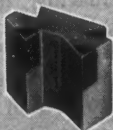


BORING TOOLS

FORM TOOLS



CIRCULAR FORM TOOLS



Please send me your new folder and wall chart covering New England Standard Carbide Tools.

NAME _____

COMPANY _____

STREET _____

CITY _____

TITLE _____

STATE _____

M.A.S.

CARBIDE TOOLS

1943 National Metal Congress and War Conference Display

To be Held at the Palmer House, Chicago, October 18
Through 22, 1943

IDEAS, methods and materials for the prosecution of the war will completely dominate the 25th Annual National Metal Congress and War Conference Displays, with major emphasis on ways and means for the metal manufacturing industries to increase the production of fighting materials, on metals conservation, and on post-war planning.

For the first time in the 25-year history of this great industrial event, all activities connected with the Metal Congress and Displays will be concentrated in a great, modern hotel where 278 rooms have been set aside for this conference and exposition. As in the past, the event will be held under the direction of the American Society for Metals, in cooperation with the American Welding Society, the Wire Association, and the Institute of Metals and Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers.

The 278 rooms in which the displays will be shown occupy three adjoining floors, all convenient to the

rooms in which the technical sessions will be held. Displays will include the latest designs in metal working equipment and materials, new metals that have been developed under pressure of war necessity, heat treating equipment and materials, cleaning and finishing materials and equipment, tools and machines for testing and control of manufacturing processes, laboratory equipment and supplies, and so on.

The Metal Congress will include speakers from all four of the national societies participating, and the papers presented will cover developments with which every industrial technician should be acquainted.

Participating manufacturers are taking this opportunity to meet with key men in the metal industry from the United States and Canada and discuss ideas and technical problems with them. Government executives will also be in attendance and will provide a display of the Conservation and Substitution Division of the War Production Board.



As Safe as at Home...

"Yes Bob ... with **LIMA GEARSHIFT DRIVES** on our machines, we are as safe as if we were in our own home".

With thousands of new hands on America's production lines today, it is vitally important that your machines and tools be equipped with the most dependable method of motivation. With **LIMA'S** driving your machines, you are certain of flexibility in your plant and production layout and sure that your operators have the utmost in Performance, Safety and Ease of Operation.

For Fast, Safe, Dependable production, specify Lima Gearshift Drives, Pedestal Grinders, Magnetic Polishing Lathes and Electric Motors. Wire or write for address of Lima Engineering Service nearest you.



Large enough to successfully serve you, yet small enough to give personal attention to your needs.



THE LIMA ELECTRIC MOTOR CO.

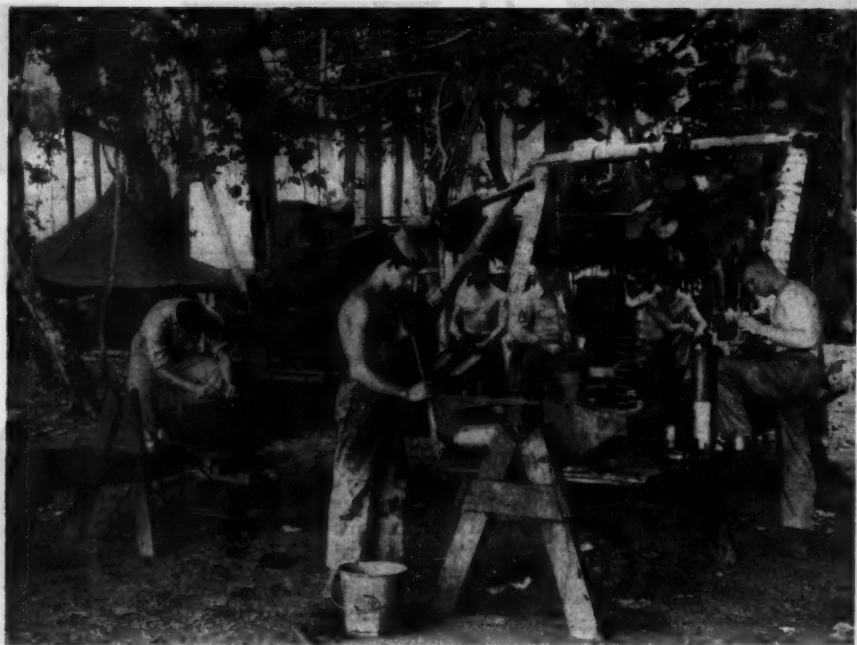
164 FINDLAY ROAD

LIMA, OHIO

REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES - LIMA ELECTRIC MOTORS
LIMA MAGNETIC POLISHING LATHES - LIMA PEDESTAL GRINDERS





Guadalcanal Machine Shop

With a blazing tropical sun searing their backs, these United States Marines tear down an anti-aircraft gun for repairs in their open-air machine shop. Making use of the best facilities and equipment

available these mechanically-trained Leathernecks keep fighting equipment in condition to hold this conquered island against the enemy.

(Official U. S. Marine Corps Photo)

Quick Carbon Determination

By a new direct method the amount of combined carbon in cast iron can be precisely determined in 15 minutes. A sample of the material to be tested is dissolved in a dilute nitric-sulphuric-phosphoric acid mixture which contains a small amount of silver nitrate as a catalyst. The combined carbon is oxidized by boiling this solution with a hot solution of ammonia persulphate and passing the evolved carbonaceous gases through heated copper oxide. Sulphur gases and water are removed and the evolved carbon dioxide is absorbed in ascorite and weighed. The procedure is

carried out in a closed system to prevent the escape of any organic gases evolved when the sample is dissolved. By the old indirect method total carbon and graphite carbon were determined and the combined carbon was estimated as the difference between these figures. The procedure required hours rather than minutes and yielded erratic results.

Alnor Exhaust Pyrometers are illustrated and described in a six-page bulletin released by Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago 10, Ill. Installations of these pyrometers on stationary and marine Diesels are also shown. Copy free.



A Letter from Guadalcanal...

In a recent letter from a lad at Guadalcanal to his former employer was voiced the greatest challenge of our time.

"What," he said, "am I, and all these fellows with me, going to do when this thing is over?" Is peace to bring with it the deadly spiral: men laid off and demobilized, hence less purchasing power, hence more plants closed down, hence more men laid off, hence — ?

We believe we've seen the answer right on the production lines and right in the post-war plans of American industry.

We've seen and consulted with hundreds of research men uncovering new secrets in metallurgy, synthetics, plastics, aeronautics — finding

new techniques and economies — planning new and wonderful products that will cushion the post-war interim to the greatest production age in history.

As internal grinding specialists, we at Bryant have already helped to solve production problems involving the machining of many new light metals, alloys, and synthetic materials including glass, plastics, hard rubber, wood, graphite, and even machine parts made of paper.

We've developed many new techniques in tooling, and we believe that this knowledge is important to your future. For that reason, our Consulting Service is available at all times. Call upon us now!

Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.



SEND FOR THE MAN FROM BRYANT



Blind Worker Assembling Kidde Valve, Using Jig Designed for Her by Another Employee. Blind Workers Have Demonstrated that, on Tasks Within Their Limitations, They Can Produce on a Par with Normal Workers

Blind Employees Have Perfect Safety Record

The employment of blind workers offers several distinct advantages. Every quantity-production manufacturer should read this article.

IF you were asked what single group of employees has a perfect safety record in industry, could you hit the jack-pot? The answer is—the blind. The records of the New Jersey State Institute for the Blind show that in 42 years no blind worker has ever been involved in an industrial accident, and this should supply food for thought to those who blame working conditions or equipment for their mishaps.

Some months ago a survey was

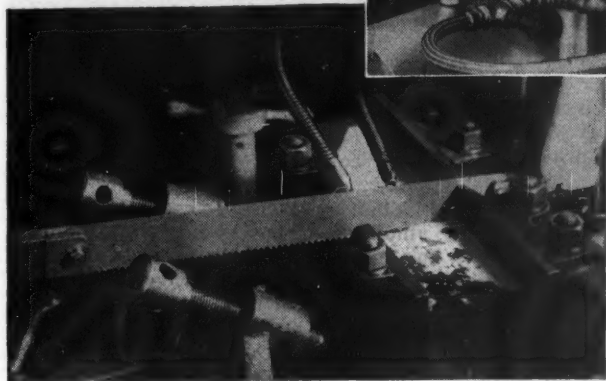
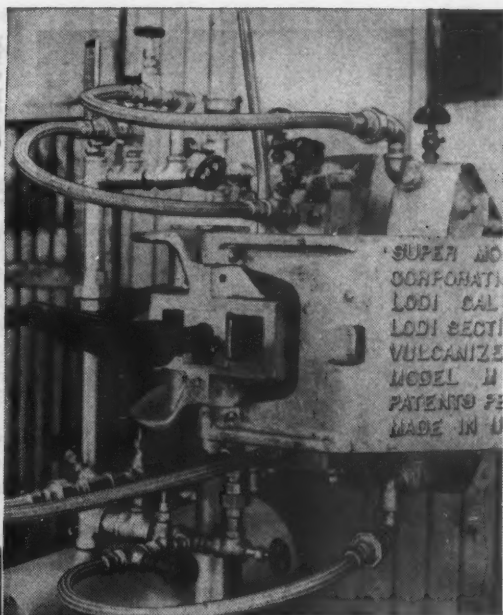
made of the operations conducted in the plants of Walter Kidde & Company to determine their suitability for blind workers. The survey was conducted by Mr. Arthur Voorhees, supervisor for the New Jersey State Commission for the Blind, who is particularly fitted to appraise such a problem. Sightless himself, Mr. Voorhees can operate a wide variety of machines, including a Warner & Swasey turret lathe.

Following his recommendations, a

**STANDS OUT
BECAUSE IT
STANDS UP**

"RETREADING WAR-NEEDED TIRES."

American Seamless Flexible Metal Tubing is ideal for steam lines on this modern tire-retreading machine made by Super Mold Corp. Fully flexible to allow free movement of the vulcanizer head, American Seamless is, of course, all metal...cannot dry out or crack under the intense heat required for vulcanizing.



"SAWING WAR-NEEDED METALS."

A Simonds Saw and Steel Co. installation showing coolant lines of American Flexible Oil Feed and Coolant Tubing. Made of spring steel wire, this superior tubing readily bends to any position... stays put when bent... directs a continuous flow exactly where needed.

Whether you need a flexible connector for conveying air, water, oil, steam or fuel—for isolating vibration or for connecting misaligned or movable parts—the chances are we have a type of flexible metal hose or tubing that will do the job more capably.

Using virtually any workable metal, we can build flexible hose or tubing for applications ranging from a simple

spout to a high pressure seamless hydraulic line that can be flexed millions of times without breaking. *American Seamless* gives you the flexibility of garden hose... the dependability of metal... and the strength of rigid pipe.

42198A

AMERICAN METAL HOSE BRANCH OF
THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut



American Metal Hose



Blind Worker Assembling Hose-and-Horn of Kidde Carbon Dioxide Fire Extinguisher. Wire Hoop Affixed to Supply Bin was Devised by Set-Up Man to Prevent Flexible Hose from Swinging into Worker's Face

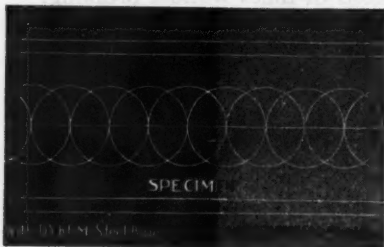
number of blind men and women were hired by the Kidde Company, trained in the plant and put to work at various operations including inspection, retapping of faulty valve threads, and several types of assembly, among the regular seeing employees.

The completion of their first six weeks' employment brought forth interesting results. In the first place, it has demonstrated that the productive capacity of the blind, on certain types of work, is as great as that of

the other workers. And not only is their record of work produced an excellent one, but their work spoilage is remarkably low and their score on absenteeism is far above the average.

B. F. Corcoran, director of training for the Kidde plants, finds that the chief concern of these blind workers is that they may not be turning out sufficient work. Their obvious desire to keep their record up to highest standards has led their fellow employees to devise a number of ingenious devices to facilitate their work. Many of these are jigs which do away with the time otherwise required to feel for proper operating position.

The presence of blind colleagues among them has had a striking effect on the morale of the other employees. They willingly act as guides to the cafeterias and rest rooms, and do all they can to make the blind feel at home and on an equal basis. The morale of the blind themselves has likewise visibly improved. They have



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.


Write for full information.

THE DYKEM COMPANY

2301 F. NORTH 11th ST.

ST. LOUIS, MO.

(In Canada: 444 Pacific Ave., Toronto, Ont.)



RED END BLADES

mark the end of your
Power-Hacksaw Troubles

New Simonds handbook, "Facts for Mechanics", tells how to get utmost service from these top-quality blades under today's conditions. Write for your free copy now.

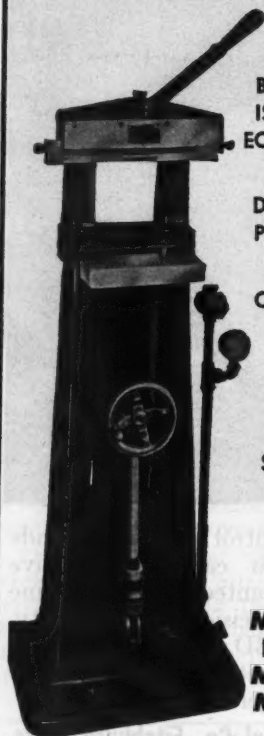
Complete quality-control . . . from Simonds electric furnaces to careful, protective packaging . . . guarantees power-machine blades of uniform precision and durability. You can bank on RED END Blades to cut more metal . . . to cut it faster and smoother . . . and to last longer.

Simonds Saw and Steel Co., Fitchburg, Mass.

SIMONDS

Famous Family
of Metal-Cutting Tools

QUICK MARKING FOR PART NUMBERS



MARKING
BY ROLLING
IS FAST AND
ECONOMICAL.

PRESERVES
DIE LIFE AND
PIECE PARTS.

REQUIRES
ONLY FRACTION
OF
APPLIED
PRESSURE
AS COMPARED
TO
STAMPING.

QUICK
SET-UPS

**MODEL 25
HI-DUTY
MARKING
MACHINE**

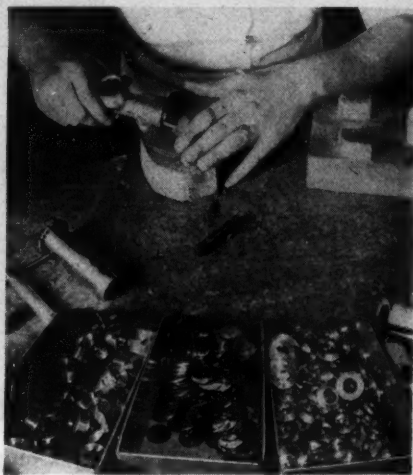
This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

GEO. T. SCHMIDT, Inc.

1806 BELLE PLAINE AVE.
CHICAGO, ILLINOIS

become more fastidious in their personal appearance, and the fact that they are able to hold their own without special supervision at the same jobs being handled by normal people has produced a noticeable effect on their general outlook.

The experiment of employing these people has proved so successful that it throws a most hopeful light into the future of our inevitable war casualties. More blind workers are being taken on in the Kidde plants, as they



Using a Spanner Devised by a Fellow-Worker, this Blind Operator Turns Out as Much Work as Her Fellow-Workers Who Have Their Sight. The Jig Does Away with the Necessity of Feeling for the Position of the Grooves

are in other companies, whenever they apply—not out of sympathy, and not because employers are being forced into it—but because it has been demonstrated that when the individual is suited to the job, a blind worker can stand up to any competition and show his heels to normal workers on several scores.

Your Life Insurance won't be worth a nickel if we lose this war. Buy Freedom Insurance, too — Victory Bondal

A G-E scientist studies the phosphors used to coat the inside of G-E MAZDA fluorescent lamps . . . part of the constant search for new and better lamps.



WARTIME LIGHTING SUGGESTION

AS PART of wartime conservation, it's important to take care of your present lighting equipment. General Electric lamps give you a lot of light for your money—the result of over 60 years of constant research and improvement. Yet dirt and dust can cut that good light in half. If you

want the full benefit of G-E MAZDA lamp research, keep your bulbs and reflectors spotlessly clean. Get all the light you pay for.

* * *

Hear the General Electric radio programs—"The Hour of Charm," Sunday, 10:00 p.m., EWT, NBC; "The World Today," News, weekdays, 6:45 p.m., EWT, CBS.

G-E MAZDA LAMPS

GENERAL  ELECTRIC

THE BEST INVESTMENT IN THE WORLD IS IN THIS COUNTRY'S FUTURE—BUY WAR BONDS



WALKER MAGNETIC CHUCKS

Walker presents a complete line of Magnetic Chucks for modern equipment . . . Rectangular, Swiveling and Rotary Types in all sizes.

**"THE BEST WAY TO HOLD MOST WORK —
THE ONLY WAY TO HOLD SOME WORK."**

Also belt or motor-driven DC and portable AC Demagnetizers.

Write for Catalog W4.

O. S. WALKER CO., INC.
WORCESTER, MASS., U. S. A.

FOR FASTER THREADING..
MORE ACCURATE THREADING..

—That Will Help You Beat Your Schedule—Install a

"MURCHEY"



4 WEEKS' DELIVERY

Today the Murchey No. 32 Thread Milling Machine is favored equipment among "those who know". It is built and geared for mass production of right or left hand internal or external threads—1" diameter up to 4" inclusive—3" long up to 1/2" pitch and covering full length of thread through annular milling cutters. Completely hydraulic work cycle and a variable speed drive permits the selection of the right speed and feed for each

job. So keep in mind always, if greater speed and threading accuracy is one of your requirements, your best answer is a Murchey.

Write for complete catalogue with specifications on No. 32 Thread Milling Machine. For larger threads, 4" to 12" in diameter, which can be cut on a mass production basis accurately and with precision concentricity, ask for literature on our No. 42 Thread Milling Machine. Address Dept. M-3.

MURCHEY MACHINE & TOOL CO., DETROIT 26, MICH.

★ Experience has proved
that best threading is of
the mill type.

MURCHEY



Checking a Thread Plug Gage on a
Bausch & Lomb Comparator at
Joshua Hendy Iron Works

The story of a Pacific Coast marine engine manufacturer who works to half a thousandth and ensures accuracy by making his own tools.

"Accuracy Guaranteed" by Joshua Hendy Iron Works

PROBABLY the most important word in the vocabulary of the modern production executive or engineer is the word "accuracy." Accuracy is probably the most important factor in the achievements of speed, quietness, flexibility, and other features of the machinery of our present-

day civilization; therefore when a manufacturer develops methods by which he can work to limits of accuracy which are unusual for his branch of industry, it is "news." Such a manufacturer is the Joshua Hendy Iron Works, Sunnyvale, California.

When Hendy completes operations



3/4 ACTUAL SIZE

TRIG-EASY is pocket size. Handy. Point arrow to unknown quantity, and correct equation appears in window. Right triangle equations on reverse side.

Speed Production Thru Education of Personnel

This Amazing Chart
Makes Trigonometry Easy

**Machine Shop—Tool Die—Jig
Bore—Patterns—Layout—
Inspection—Drafting**

40 TRIGONOMETRIC EQUATIONS are quickly found on the TRIG-EASY CHART which eliminates all errors through use of wrong equations. Angles and dimensions are determined without a knowledge of higher mathematics.

Makes TRIGONOMETRY Easy

The TRIG-EASY CHART quickly gives you the answer on jobs requiring machine surfaces, holes drilled at angles, etc. On every job, where angles and dimensions are different, a lot of time is wasted waiting for someone to calculate how to set up the job.

With this amazing TRIG-EASY CHART, every man whose work requires a solution of problems involving angles, will save his time and time for those who must wait for needed calculations.

TRIG-EASY makes Trigonometry easy

and breaks time-wasting bottlenecks. You save calculating time with instant correct equations. TRIG-EASY pays for itself in time saved, every time it is used.

Handy vest or shirt pocket size. Grease-proof and sturdy to resist moisture and dirt. Over 18,000 in use by many of the largest concerns in U. S. and Canada.

TRIG-EASY costs only 50¢ with complete instructions and MONEY-BACK GUARANTEE. You can speed production thru education of personnel. Send for your TRIG-EASY CHART today.

E. H. Needham

TRIG-EASY

Dept. 3-E

Culver City, Calif.

QUANTITY DISCOUNTS TO INDUSTRIAL FIRMS



This Special 14-Foot Measuring Machine was Built Especially for Checking the Accuracy of Large Pin Gages. Set Up in an Air-Conditioned Room, It is Accurate to 0.0005 Inch

Hendy now has what is said to be the most completely - equipped gage testing laboratory on the Pacific Coast, and one of the best in the United States. The application of dimensional control through the agency of this laboratory has resulted in substantial savings in materials, man - hours, and production costs throughout the plant.

on a turbine blade or part of a reciprocating steam engine, there is no question about the accuracy of the operations involved. In some cases the dimensions are accurate within half a thousandth of an inch (5/10,000). Accuracy in marine engine manufacture is not an exclusive Hendy attribute, but the scale upon which the accuracy is carried out and the methods that have been developed to accomplish it are Hendy accomplishments.

The background that led to the establishment of the laboratory is interesting. Less than two years ago the (then) obsolete Hendy plant was taken over by Charles E. Moore, now president of the concern. The history of the plant reached back to California's "gold rush" days, and its products through those years had largely been confined to mining equipment. Mr. Moore equipped the plant with modern machines and tools and went after orders to keep it busy. In a sur-

Produce with **SAFETY!**

It pays to protect your operators by equipping your presses with

STRAND Enclosure Safeguards

Easily installed. Adjustable to any size die. Quickly changed for any set-up. Available with or without Transparent Shield. Write for circular.

STRAND MFG. CO., INC.

156 N. Desplaines St.

Chicago 6, Ill.





Running low on supplies? Telephone your **ISD** first!

An empty stock bin is like an empty gauge glass on a boiler—warning ahead of plenty trouble quick. How about *your* supplies—do you have enough help in keeping reserves at a safe level? It's wise to guard against shortages in advance—telephone your **Industrial Supply Distributor first!**

For he knows—if you have given him the chance to keep informed—what materials you are going to need, and when. He orders ahead for you—enough to keep you going, even if not a full supply. He does his best to

make spot deliveries—usually he succeeds.

Your Distributor has access to the same manufacturing sources that your own Purchasing Department has. He buys in volume—he is an important customer. He buys on the same high priorities that you do—and when his orders go into the factory schedule, no other orders of equal priority can bump them off.

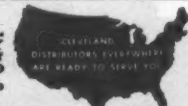
For the sake of your own production schedules and your peace of mind as well—telephone your **Industrial Supply Distributor first!**



The CLEVELAND

300 BROAD ST. NEW YORK - 8 NORTH JEFFERSON ST. CHICAGO
610 SECOND BLVD. DETROIT LONDON - 2, A BARRACKS, LTD. - 20-30-37 UPPER THAMES ST. E.C.4

TWIST DRILL COMPANY
1242 EAST 49TH STREET
CLEVELAND



prisingly short time the company had won the distinction of being the largest producers of marine engines in the world.

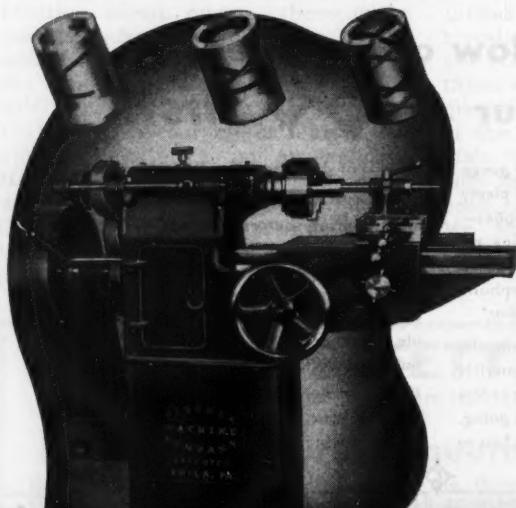
The first order was for twelve 2,500 h.p. triple expansion reciprocating engines, but this was dwarfed within a few months by an order for 100. The plant has completed more than 350 of these 137-ton mammoths to date, and will build one-third of all the engines used in the Liberty Ship fleet.

While the building of these engines comprises a major part of the production program at Hendy, this order was only the beginning. In rapid succession orders for two classes of marine turbines were received, followed by an order for a number of 2,750 h.p. steam engines to power the Navy's fast-building convoy escort fleet. The complete facilities for building these four types of engines have been completed and production is well under way on all of them. The turbines are

4,000 s.h.p. for C-1 cargo vessels and 8,000 s.h.p. for C-3 cargo vessels. Hendy is the first Pacific Coast manufacturer of turbine engines.

The necessity for expanding the plant while production operations were in process set up some unusual problems, but Hendy was faced with an accuracy control problem equally complex. The importance of precision in the manufacture of parts for turbine engines is well-known to engine designers. At the high speeds at which these engines operate, an error in machining to the required limits might well be responsible for the failure of the engine under disastrous circumstances.

Drawing upon his years of experience in machine tool work, Mr. Moore conceived the idea of developing a gage control laboratory which would, by virtue of a complete range of equipment and a system of gearing the laboratory to the production de-



FISCHER *Oil Groovers*

A wide variety of grooves may be cut on the "FISCHER" . . . with minimum set-up time and cost.

Bearing in which groove is to be cut is mounted on revolving chuck secured on work spindle. Boring tool is secured to carriage slide which has a reciprocating motion timed with work spindle and linked by crank gear and connecting rod.

Several attachments can be furnished for cutting practically any type of oil groove.

Capacity of No. 1 Machine—5" dia. . . . No. 2 Machine—15" dia

PROMPT DELIVERIES

Write for catalog.

FISCHER MACHINE CO.

310-16 N. ELEVENTH ST.

PHILADELPHIA, PA.

**JOHNSON
BRONZE**

The BEARING
that LUBRICATES
itself



LEDALOYL
SELF LUBRICATING
REG. U. S. PAT. OFF.

Oil is the life blood of every motive unit. In order to gain smooth, quiet operation; long, satisfactory bearing life, we must have the right amount of oil . . . in the right place . . . at the right time.

Johnson LEDALOYL bronze bearings provide this type of performance. Evenly distributed over all surfaces of every LEDALOYL bearing are millions of tiny, evenly spaced pores. Each pore serves as a miniature oil reservoir providing a thin, protecting film of lubricant between the shaft and the bearing.

Johnson LEDALOYL Bearings are ideal for any place where lubrication is hard to achieve, likely to be neglected, or where excess oil might damage goods in process. A request, will bring the complete story and the actual operating facts concerning LEDALOYL. Write today.

JOHNSON BRONZE CO.

Sleeve Bearing Headquarters
590 S. MILL ST. • NEW CASTLE, PA.



One of the Large Bow Micrometers Being Used to Check a Pin Gage. Bow Micrometers up to 84 inches Capacity are Used to Check the Diameters of Cylinders, Pistons, and the Large Gears Used in Reduction Gear Assemblies

has extended its services beyond the plant to the sub-contractors, of whom more than 130 supply Hendy. Through Hendy's dimensional control their products are processed to meet Hendy's specifications. Thus precision and accuracy have become the Hendy standard throughout, carefully controlled by the gage control laboratory.

The Hendy laboratory was developed along the most modern instrument laboratory lines. The room is 25 by 40 feet. The vital matter of temperature control is assured by an air conditioning system which

partment, solve the problem. The planning and organization of the laboratory was delegated to Mr. H. C. Gunetti, general superintendent of the works.

Not only has the laboratory filled the requirements at the plant but it

maintains the laboratory at the standard 68 degrees. Shadowless, uniform lighting is another feature. Banks of fluorescent lamps to a total of 6,500 watts line the four walls and ceiling, which are painted white. The laboratory is operated under the di-

HINGES

VARIOUS WIDTHS
and GAUGES



BUTTS AND
CONTINUOUS LENGTHS

WRITE FOR PRICES

For
GUARDS
CABINETS
CASES
BOXES

S & S MACHINE WORKS

4541 W. LAKE STREET HARDWARE DIVISION CHICAGO, ILLINOIS

come-
a Pin
up to
ed to
cylind-
Large
Gear

rices
the
thom
Hen-
di-
eir
d to
fica-
and
the
ugh-
olled
lab-

tory
the
ment
oom
vital
con-
air
hich
nd-
orm
nks
of
and
The
di-

S

943

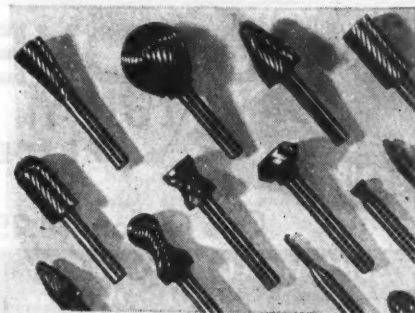


**SEVERANCE MIDGET
MILLING CUTTERS—
2 TO 3 TIMES FASTER
THAN ROTARY FILES***

* Hand cut and mill cut.

FASTER

Because of their hardness, design and keen cutting edges, Severance Midget Milling Cutters speed up finishing time, easily do the job two to three times faster than rotary files. Severance Midget Milling Cutters take deep, sharp bites and throw off real chips rather than merely burnishing.



CHEAPER

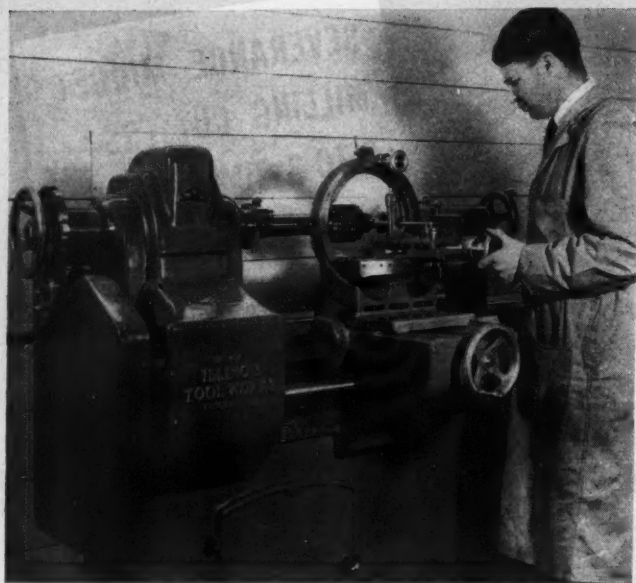
A Severance Midget Milling Cutter lasts 3 to 5 times longer than a rotary file and after the teeth are worn, it can be successfully reground as many as 60 times. Thus Severance Midget Milling Cutters not only cost considerably less, but they also save critical high speed tool steel.

BETTER

If you are interested in deburring, counter-sinking or finishing—better, quicker, and at less cost than ever before—it will pay you as it is paying scores of other manufacturers, to use Severance Midget Milling Cutters.

Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING
SEVERANCE TOOL INDUSTRIES, INC., SAGINAW, MICH. •
PLANTS IN LONG ISLAND CITY, N.Y., DETROIT, MICH.,
FORT WAYNE, IND., CHICAGO, AND LOS ANGELES



Checking a Hob in a Universal Measuring Machine, Product of Illinois Tools Works

Following this plan of action, George D. Bowman, chief tool engineer of the plant, put his department to work on building a measuring comparator which would not only handle pin gages 80 inches in length but up to 14 feet. The machine is now in use, and will measure with an accuracy to $5/10,000$ th of an inch.

rection of M. F. Jirka, who went to Hendy from the U. S. Army Ordnance Laboratory at Stanford University.

In equipping the laboratory, it was found that a standard measuring device was not available which would accommodate pin gages beyond an upper limit of 80 inches. A standing order from Mr. Moore is, "If a tool is needed for a job and it isn't available, make it. If it doesn't exist, invent it. And, if necessary, make machine tools to make machine tools."

One of nine such devices in the United States is the Illinois Tool Works hob and worm measuring machine at the Hendy laboratory. The lead of the hob, the profile of teeth, the gash or flute and the rake are all checked by this machine. Three different types of equipment are available for hardness tests; the Brinell, Rockwell, and Sceleroscope systems.

For measuring pin gages, plug gages and thread gages under 80 inches in length the laboratory is

Micro
Supreme

IMPROVED

LAY-OUT DYE

for TOOL,
DIE, PATTERN,
OR TEMPLATE
LAYOUT ON METAL

for
SHARPLY DEFINED
SCRIBED LINES

LOW IN
PRICE

One Gallon, \$4.25

MICHIGAN CHROME & CHEMICAL COMPANY
6350 East Jefferson Avenue • • • Detroit, Michigan



and Better
**Something New Has Been Added
 to Swing Frame Grinding**

METALITE CLOTH BELTS

**Remove More Stock—Cut Faster—Cut Cooler
 Increase Production—Finish Better—Reduce Costs**

Be Sure to Investigate

BEHR-MANNING

(DIVISION OF NORTON COMPANY)

TROY, N. Y.

**MAIL THIS
 COUPON**

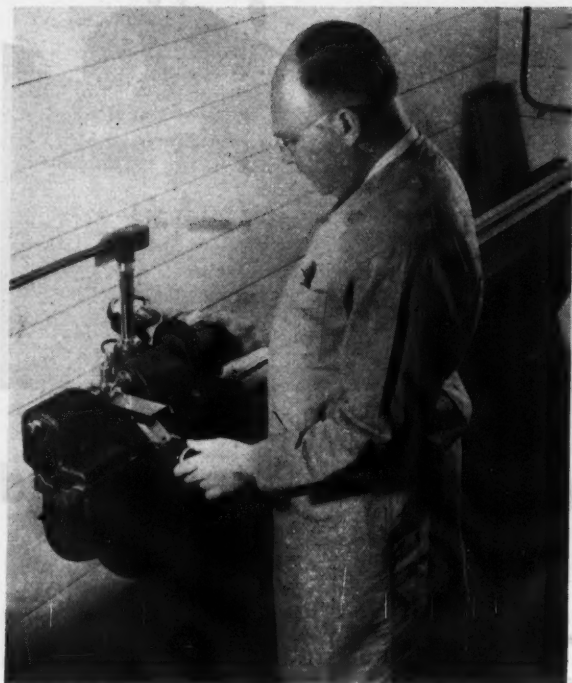
Please send folder on *NEW*

Swing Frame Grinding Methods

Firm.....

Address.....

by..... Title.....



Using a Pratt & Whitney Gage Testing Machine to Check the Pitch Diameter and Lead of the Thread on a Thread Plug Gage

equipped with a Pratt and Whitney standard measuring machine which makes possible a guaranteed measurement to 10/1,000,000ths of an inch. A Pratt and Whitney Super-Micrometer has also been added to the equipment.

A Bausch & Lomb contour projector is used to check special gages and tools. It has a magnification of 1 to

100 which can be used on smaller pieces with other magnifications of 1 to 50, 1 to 25 and 1 to 10.

Other equipment in the laboratory includes an Ashcroft Gage Tester for checking pressures from five to 1,000 lbs., a Bausch & Lomb Toolmaker's Microscope, a 36 by 72-inch master surface plate, a Michigan Tool Company hob checking machine, a Magnafix magnetic inspection apparatus for detecting disconti-

nuities, imperfections and flaws in tools and metal parts, a set of master gages for blading on the C-1 turbines (this is to be followed soon by a set for the C-3 and Terry 300 kw lighting units), optical flats for surface testing, a complete set of thread measuring wires for both Acme and V types of threads, and three sets of Pratt & Whitney precision gage blocks, to-

GEM DRILL PRESS AND MACHINE VISES...



Modern Vises for Tool-room and Production. Sizes ranging from 3" to 10 1/4" opening. Strong, Versatile, Quick-Acting. Pay for themselves in time-saving.

Write for circular describing entire line of GEM MACHINE VISES.

J. E. MARTIN MACHINE WORKS
548 State St. Springfield, Ohio

THIRD IN SERIES

To Mill Steel efficiently
up to 550 BRINELL HARDNESS

The Problem

The Solution

Kennamilling

KENNAMILLING HAS BECOME
INCREASINGLY POPULAR BECAUSE:

Armor plate brackets were being milled with high speed steel; only 30 were completed before the high speed steel cutter became dull. A six-bladed home made cutter with $22\frac{1}{2}^\circ$ and 67° side cutting edge angle was made, with KENNAMETAL Style 12T50 tools.

The 6-blade, 6" diameter cutter was run at 80 rpm, 8" table feed per minute, .016" feed per tool, and depth of cut $7/16"$. 176 brackets were milled through KENNAMILLING before the blades needed resharping.

KENNAMILLING, sometimes referred to as Hyper-milling or Super-milling, since April 1940 has enabled plants to obtain the greatest possible steel-cutting production on face-milling operations. The strength and hardness of KENNAMETAL steel-cutting carbides now have been combined with the rugged Meehanite bodies of GRAYSON KENNAMETAL milling cutters to form the GRAYSON-KENNAMETAL shock-resistant milling cutter, designed for maximum production on milling operations on all metals.

Write for complete information about KENNAMILLING, the pioneer process of face-milling steels with cemented carbides. KENNAMETAL engineers will assist you in selecting the proper type GRAYSON-KENNAMETAL milling cutter for your particular milling problem.

1. Face milling can be done at startling speeds.
2. KENNAMILLING permits greater table feeds and greater loads per tooth.
3. KENNAMILLING permits the use of double negative rake angles to produce a very rugged milling cutter.
4. KENNAMETAL'S non-galling properties, hardness, and rupture strength permit milling of High Brinell steels.
5. KENNAMILLING produces precision finishes and is not limited to light cuts.



KENNAMETAL Inc.

300 LLOYD AVE., LATROBE, PA.

Trade Dress Reg. U. S. Pat. Off.

Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
(Exclusives of Canada and Great Britain)



gether with height gages and other small measuring tools.

With so well equipped a laboratory and a close coordination in dimensional control with all departments of the plant and all sub-contractors, Hendy has established a high standard of uniformity in its measurement control—no small part of its production efficiency.

Women's Industrial Corps

The women in American industry now have an emblem, too. Christened recently by Harry Woodhead, President of the Consolidated Aircraft Corporation, as the "Wics," Mr. Woodhead called on all industry engaged in war production to give women workers the recognition accorded the Waacs, Waves, and Spars.

Mr. Woodhead said, "Women fighting the hard battle of production of needed fighting materials are as vital to our

ultimate victory as any other woman who leaves her home responsibilities to replace men who have gone to the front.



All industry can well join in honoring the greatest, grandest army of them all—our Women's Industrial Corps."

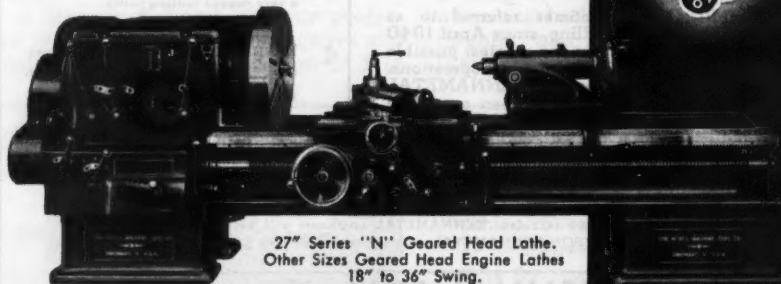
NEBEL Geared Head Lathes

A MODERN LATHE. ALL THE LATEST IMPROVEMENTS.

Timken Bearings
Self Oiling Headstock
Chrome Nickel Shafts

Quick Change Gear
Double Well Self Oiling Apron
Quick Action Apron Levers
Thread Chasing Dial

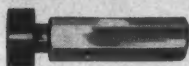
We also manufacture a line of Removable Block and Extension Bed Gap Lathes.
Write for circulars.



27" Series "N" Geared Head Lathe.
Other Sizes Geared Head Engine Lathes
18" to 36" Swing.

The Nebel Machine Tool Co.
CINCINNATI, OHIO

COURTESY THE JOHN BERTRAM & SONS COMPANY, LIMITED DUNDAS, CANADA



Accurate **RAPID INSPECTION OF TOOLS AND GAGES**

Jones & Lamson Optical Comparators

assure accurate, rapid inspection of tools and gages in the Pratt & Whitney Plant of John Bertram & Sons Co., Dundas, Canada.

The use of these **Comparators** by progressive manufacturers everywhere, has resulted in better tools and gages, increased efficiency in inspection departments and

substantial savings in materials and costs.

Various models are available to cover an almost unlimited range of inspection work, and our inspection engineers are ready to study your problems and make recommendations based upon more than twenty years' experience in the field of inspection by optical projection.



JONES & LAMSON

Universal Turret Lathes . Fay Automatic Lathes . Automatic Thread Grinders . Optical Comparators . Automatic Opening Threading Dies

MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.
Profit-producing Machine Tools



Largest Honing Tool

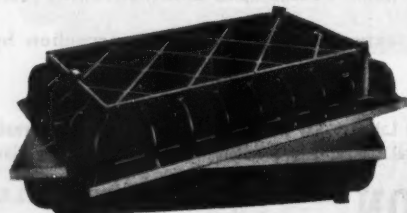
THE largest hone abrading tool which has ever been made was recently shipped by Micromatic Hone Corporation, Detroit, Michigan, to a war contractor.

This hydraulically-controlled hone is 41½ inches in diameter by approximately 63 feet long overall, and weighs approximately 6500 pounds. It is intended for use in a bore 40 feet long and it is anticipated that approximately 1/16 inch of stock on the diameter must be removed to clean up the bore. This will amount to approximately 1990 cubic inches of metal removal, or more than 550 pounds of metal to be removed by the abrading process.

The tool is used in a special horizontal honing machine which was designed and built by the Barnes Drill Company, Rockford, Illinois.

Welding Chart. A chart containing concise information relative to uses, physical properties, application, and so on, of Castolin Eutectic Low-Temperature Welding Alloys has been prepared by Eutectic Welding Alloys, Inc., 40 Worth St., New York, N. Y. Copy free upon request.

REID PRECISION-PLANED SURFACE PLATES



Accuracy guaranteed on 12" x 18" size within .0005". On 36" x 72" within .0015".

Thoroughly normalized and weather seasoned Reid Precision-Planed Surface Plates have proved thoroughly satisfactory on work to close limits.

Excellent delivery—Write for prices—details.

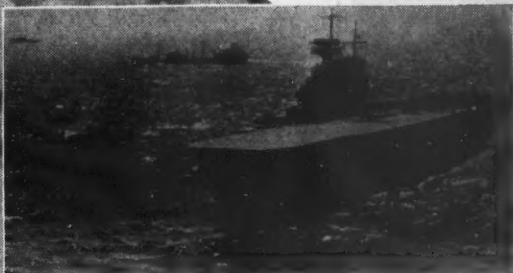
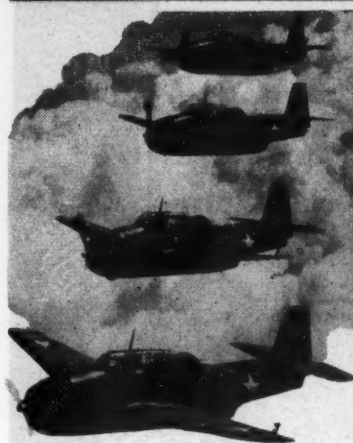
TOOL ENGINEERING SERVICE CO.

241 Washington Ave.

Nutley, N. J.

Support to "Shangri La"

Official U.S. Navy Photos



Maintaining the "eyes of the fleet" calls for constant conditioning of planes, engines and parts. In manufacture as well as maintenance, time and work savings plus precision results in

FINISHING • DE-BURRING • POLISHING • are assured by

WELDON ROBERTS

B r i g h t b o y

"The Soft Rubber Binder Cushions the Abrasive"

Brightboy's time savings in the precision production and maintenance of planes, ships, engines, tanks, parts, munitions, constitute a war-proved achievement in the field of abrasive finishing materials. It's the soft rubber binder that

does the trick! Find out what Brightboy can do for you. If your distributor cannot furnish you with "Methods and Applications" data, catalogs and prices, write us. Our field representatives are at your service.



BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO., Newark, N. J.



"R" --- "KR"

...know what they stand for

***Special Monels with
Superior Machining Properties***

The strength and corrosion resistance of Monel are so well known that they require no comment.

But do you realize that in addition to *regular* Monel, there are two *special* Monels—"R" Monel and "KR" Monel?

"R" Monel . . . When introduced several years ago, "R" Monel made available the properties of Monel coupled with improved machinability.

➡ SAVE MACHINING TIME AND MONEY...

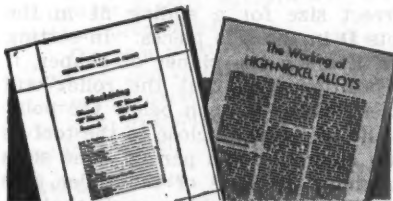


"R" Monel is readily fabricated by cold forming—is produced as hot-rolled and cold-drawn rounds, squares and hexagons. It is ideally suited for the automatic production of rust-proof screw machine parts, yet has mechanical properties equal to steel screw stock (S.A.E. 1112), and is actually tougher.

"R" Monel is NOT heat-treatable. (See "KR" Monel below.)

"KR" Monel . . . The newest member of the Monel family, "KR" Monel, offers machining qualities you wouldn't expect to find in a metal with so many other superior properties—corrosion resistance combined with non-magnetic characteristics, plus exceptional hardness and strength that can result only from heat treatment.

"KR" should be used for screw machine products which are to be heat treated after machining. Remember "KR" Monel as the MACHINABLE brother of "K" Monel, long known for its great strength and hardness. The International Nickel Company, Inc., 67 Wall Street, New York, N. Y.



FREE BULLETINS . . . Machining Techniques for both "R" and "KR" Monel are clearly and fully described in Machining Bulletin T-12. So many plants now have contracts requiring the machining of these metals that supplies of this bulletin are being made available to all who are faced with machining problems. Don't hesitate to write for as many copies as you can use. Ask also for the reprint—"The Working of High Nickel Alloys".

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York, N. Y.

Gentlemen: Please send me copy of your Machining Bulletin T-12 and also the reprint "The Working of High Nickel Alloys."

NAME _____

TITLE _____

COMPANY _____

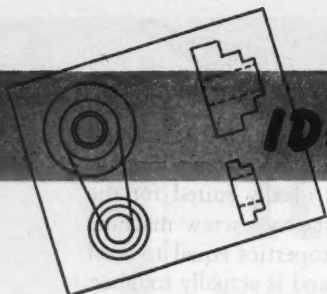
N. M. S. 9-48

ADDRESS _____

Specify "R" Monel and "KR" Monel

September, 1943

MODERN MACHINE SHOP 193



IDEAS FROM READERS

Tool Lifter for Planer

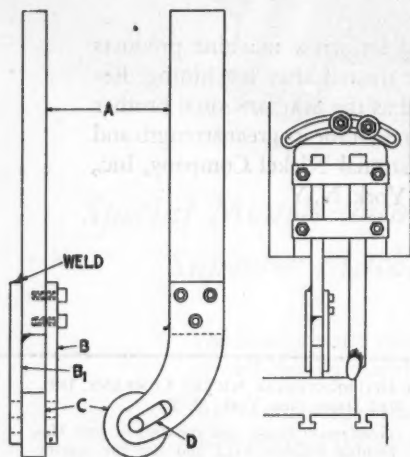
By A. W. PAYNE

IN order to maintain the cutting edge of the tool on a shaper or planer, it is sometimes advisable to devise means for raising the tool on the return stroke. A leather strap or

roller that is held in its shank in such manner that it can move up and down in its bearing. Clamped into the toolholder alongside the cutting tool, the roller slides up away from the work on the cutting stroke, then drops to the bottom of the slot and thus serves to swing the toolholder out at an angle on the return stroke, keeping the tool clear of the workpiece and thus preserving the cutting edge.

The shank **A** is a section of $\frac{3}{4}$ x $1\frac{1}{2}$ x 10-inch soft steel, to which two pieces of $\frac{3}{8}$ x $1\frac{1}{4}$ x 5-inch steel **B** and **B1** are bolted with capscrews to serve as the roller support. The steel roller, **C**, which is 2 inches diameter by $\frac{47}{64}$ inch long, has as its axle a $\frac{1}{2}$ -inch diameter pin, $1\frac{1}{2}$ inches long, that is driven through a hole in the roller.

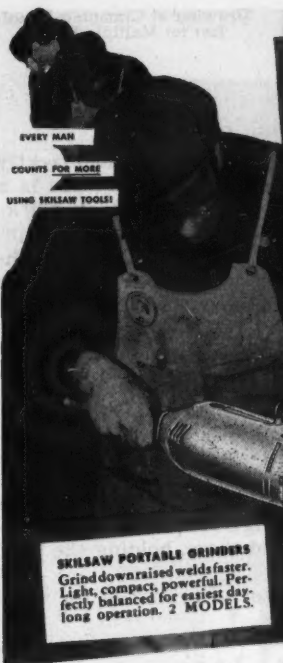
The ends of the axle are of the correct size for a sliding fit in the slots **D** in the side pieces. In setting the lifter on the planer or shaper, it is positioned so that the roller will extend about $\frac{1}{8}$ inch below the point of the tool, and as close to the tool as chip clearance will permit. The slots in which the ends of the roller axle ride are cut at such an angle that, on the forward or cutting stroke, the roller will slide upward in the slots and simply ride over the work. On the return stroke, however, the roller drops down into the bottom of the slots and serves to swing the toolholder outward, holding the tool clear of the work surface.



Drawing of Tool Lifter which Swings Planer Tool Free of Work on Return Stroke

similar device is frequently used, but the tool lifter shown in the drawing has been found by the writer to be the most satisfactory. Besides, it is inexpensive as to cost.

The lifter consists primarily of a



SKILSAW PORTABLE GRINDERS
Grind down raised welds faster. Light, compact, powerful. Perfectly balanced for easiest day-long operation. 2 MODELS.

• Have you welds to grind . . . metals to clean . . . "final-finishing" to apply on wood or brass or steel? You can do each job better and faster with one of these SKILSAW TOOLS! They're specially designed for easier handling. They're skilfully engineered for greater output per man at war-time production speeds. They're ruggedly built to stand the gaff of toughest 3-shift operation without time-wasting breakdowns.

Do you wonder why these SKILSAW SANDERS and GRINDERS are favorites everywhere for coarsest grinding or finest buffing. Ask your distributor for a demonstration and see for yourself!

SKILSAW, INC., 5037 Elston Ave., Chicago
New York • Boston • Buffalo • Philadelphia • Cleveland • Detroit
Indianapolis • St. Louis • Kansas City • Atlanta • New Orleans
Dallas • Los Angeles • Oakland • Portland • Seattle • Toronto, Can.

SKILSAW PORTABLE ELECTRIC **TOOLS**
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

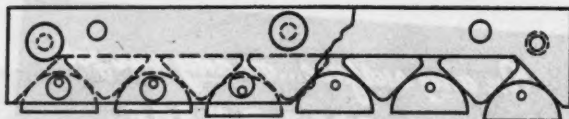
On any surface...on any war job
SKILSAW
SANDERS and GRINDERS
GIVE YOU
Finer Finishing Faster!



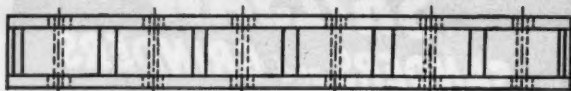
SKILSAW DISC SANDERS
Speed up all metal cleaning, sanding, filing, grinding with wire brushes (illustrated), cup wheels, polishing pads, etc. 6 MODELS.

SKILSAW BELT SANDERS
Produce a smoother, better "final finish" 10 times faster than by hand . . . on wood, metals, plastics, compositions. 4 MODELS.





Drawing of Clamping Equalizer for Multiple Fixture



Clamping Equalizer for Multiple Fixture

A UNIVERSAL pressure equalizer for use in clamping multiple pieces of different thicknesses which cannot be held in a standard clamping device has been developed by Daniel Wollpert of General Electric's radio transmitter planning department.

The equalizer is constructed with movable parts that allow pressure to be shifted and equalized across the face of the clamp. Multiple pieces

then can be held tightly even though there is a variance in their thicknesses due to machining tolerances. An ordinary vise could not hold a multiple of pieces tightly enough for machining purposes.

The shifting of pressure is accomplished by allowance for movement of the equalizer parts, which consist of half round and triangular pieces. When there is a difference in thicknesses of the parts to be held, the half-round pieces shift their position and the triangular pieces shift into position behind them, holding the part securely.

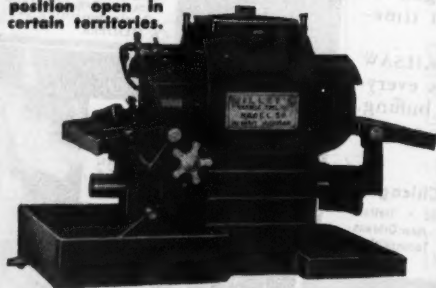
The equalizer is primarily for mill-

WILLEY'S

NEW BENCH TYPE GRINDER

DEALERS

An attractive proposition open in certain territories.



The new Model 50 is compact, designed for rapid, economical wet or dry grinding of tungsten carbide tipped tools as well as other types of tool bits ranging up to a maximum of 1 1/4" square or equal cross sectional area.

A precision grinder built for accurate work, capable of real production. Available with pedestal base if desired.

WRITE FOR FOLDER

Contains complete specifications of Model 50 and other models.

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway,

Detroit Michigan

ual-
s
tly
s a
ck-
in-
di-
ple
in-
m-
of
of
es.
k-
he
on
to
rt
ll-



MARVEL SAWS

For steel tubing they use a MARVEL No. 8 Band Saw at Douglas Aircraft

You'll find different types of MARVEL Saws in the giant Douglas Aircraft Plant at Santa Monica each doing work in which it surpasses all other saws. Take the MARVEL No. 8 shown above, it has proven "an excellent" piece of equipment" for cutting-off steel aluminum and aluminum alloy tubing of many types and sizes in innumerable lengths and at all angles because the blade can be fed to the work at any angle from 45° right to 45° left.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

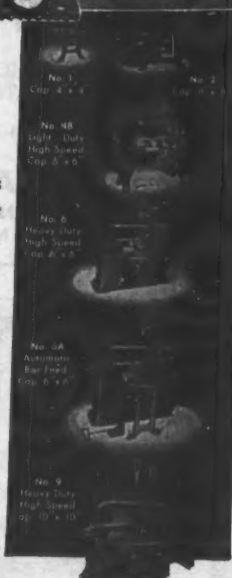
Eastern Sales Office: 225 Lafayette St., N. Y.



No. 9A
Automatic
Band Saw
Cap. 10" x 10"

No. 8
Marcel
Band Saw
Cap. 10" x 10"

No. 18
Cutter
Hydraulic
Cap.
10" x 10"



No. 1
Cap. 4" x 4"

No. 4B
Light Duty
High Speed
Cap. 8" x 8"

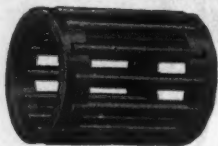
No. 6
Heavy Duty
High Speed
Cap. 8" x 8"

No. 6B
Automatic
Band Saw
Cap. 8" x 8"

No. 9
Heavy Duty
High Speed
Cap. 10" x 10"

ing, but can be used with any standard or cam vise. It is adaptable for clamping either round or rectangular pieces as well as pieces with irregular surfaces such as castings. It can also be used as part of an assembly fixture. When used in a vise it is fastened securely to the movable jaw. The stationary jaw is then made to suit the shape of the parts to be machined and is spaced to match the equalizer.

GWILLIAM JOURNAL ROLLER BEARINGS



Type JR

STANDARD SIZES SHOWN IN OUR
GENERAL CATALOG

Copy Sent Upon Request

THE GWILLIAM CO.

358 FURMAN ST.
BROOKLYN, N. Y.

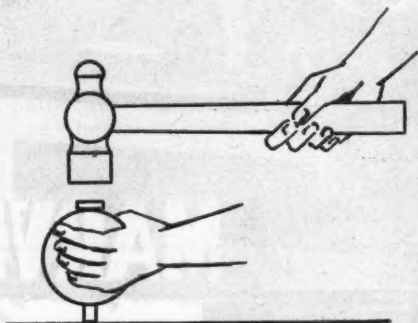
Using Nail as Sheet Metal Punch

By A. H. WAYCHOFF

THE drawing illustrates the tools used by a local mechanic to punch holes in sheet metal when a punch of the correct size is not available.



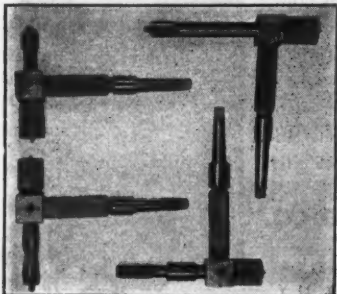
A



B

Drawing Illustrating Method of Using Common
Steel Nail to Punch Sheet Metal

The punch is a common steel nail, of which there are so many sizes that one of the right size for the job can always be found. A hand hammer is



INVINCIBLE Angle Tool Attachments Reach the Spot!

Drilling
Reaming
Tapping
Nut Running

Counter Boring
Spot Facing
Counter Sinking
Screw Driving

Burring
Grinding
Keywaying
Threading

Vertical and Angular Milling

Send us your inquiries for Angle Tool Attachments for Tanks, Gun Mounts, Turbine Blading, Torpedoes, Ships, Gun Carriages or any problems you have at any time for tools for any operations in close corners and narrow spaces.

Write, wire, or phone ATLantic 5586-5587

INVINCIBLE TOOL COMPANY

611 Empire Bldg.

Pittsburgh, Pa.

AN ANNOUNCEMENT
WORTH NOTING!



*The K. O. Lee Co.
Presents:*

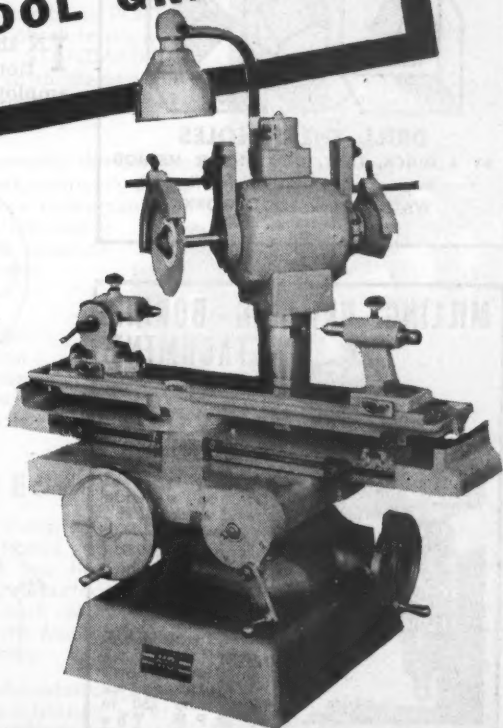
**THE NEW MODEL B600
UNIVERSAL
TOOL GRINDER**

**Just off the Assembly
Line.**

Retaining all the fine features that characterized the Model A600 Grinder, and adding many features that distinguish the new model B600, K-O Engineers are proud to present this new and improved UNIVERSAL TOOL GRINDER!

Write for Bulletin
UTG-43-10M

KNOCK-OUT



THE K. O. LEE CO.
ABERDEEN SOUTH DAKOTA

used to drive the punch through the work, but a solid rubber ball is necessary to keep the nail from bending in the process.

The rubber ball should be $1\frac{1}{2}$ inch to 2 inches diameter. Having a nail of the correct diameter, the nail is cut off at the pointed end and left just long enough so that it will project very slightly beyond the surface when driven through the center of the ball, as shown at A.



DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

WATTS BROS. TOOL WORKS
Wilmerding, Pa.

MILLING - DRILLING - BORING ATTACHMENT

for

Heavy Duty Operations

Uses many types of cutters on a wide range of work. $1/16"$ to $1/4"$ end mills.

FEATURES

Large size spindle with No. 3 B&S Taper. Large quill diameter with a travel of 4". Furnished with $1/2$ h.p. motor.

The aluminum pulleys provide a range of six speeds, from 250 to 3000 R.P.M. The spindle takes $1/16"$ to $1/4"$ end mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader screw for easy mounting.

IMMEDIATE DELIVERY
Send for Descriptive Folder.

RUSNOK TOOL WORKS

4840 W. North Ave.

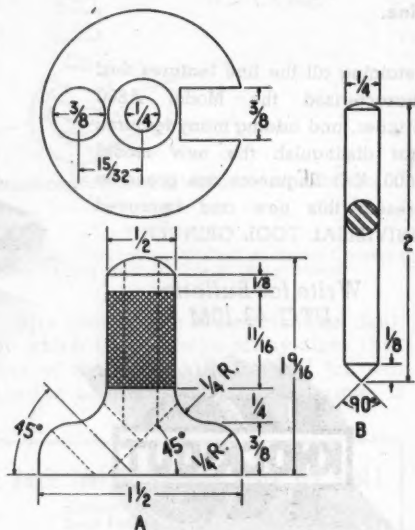
Chicago, Ill.

When struck with the hammer, as shown at B, the nail will pierce the work and at the same time the ball will flatten under the impact of the hammer—but it will hold the nail straight. When the nail is withdrawn from the hole, the ball will return to its original shape. If the nail has a sharp edge with which to cut, a fairly good job can be done in an emergency.

Toolmaker's Center Punch

By C. F. Fritz

IN these days of high speed production, with a large number of people employed on metal manufacturing production who are limited as to skill



Drawing of Toolmaker's Punch

and training, it is necessary for industry to do everything possible to make the jobs "fool-proof" and keep the amount of skill required at the minimum.



ACCURATE
as a Bench Comparator
but **FAST**
and **PORTABLE!**

HERE'S A GAGE that combines PORTABILITY with speed in use and absolute accuracy on dimensions as fine as .0001". STANDARD Dial Snap Gage is portable and easy to handle as a conventional snap gage, yet has the quantitative accuracy of a stationary instrument.

Adjustable gaging pin has a serrated flat surface tipped with tungsten carbide that practically **defies wear**. Opposite movable pin has mushroom top, also tungsten carbide. Point-and-plane construction assures continued, accurate readings whether instrument is set by cylindrical or flat standards.

STANDARD Dial Snap Gages speed inspection, guard against rejects and eliminate human variations not only on precision work but also where tolerances are comparatively liberal.

FEATURES

1. High precision indicator approximately 1" in diameter graduated .0001". Bezel rotates for convenient setting.
2. Measuring anvil tipped with tungsten carbide. Indicator protected against shock by sudden applications to measuring pin.
3. Tungsten carbide tipped adjustable anvil has flat lapped serrated surface. Chips and dust readily clear from it, helping insure accuracy.
4. Adjustable, spring-cushioned safety stop reduces jar, helps hold work in correct gaging position.
5. Air space under grip protects against hand heat.



STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



*They're Vital
to the Aircraft Industry*



... NORTON MOUNTED POINTS AND WHEELS

BURRING is an important finishing operation on thousands of aircraft parts—both in the airframe plants and the motor plants. And many of these burring operations are being done with Norton Mounted Points and Mounted Wheels.

They are available in nearly 200 standard sizes and shapes, made of Alundum or Cryston abrasives, with vitrified, resinoid or rubber bond. They are securely cemented on rust-resistant steel spindles. Complete catalog on request.

**NORTON COMPANY • Worcester 6, Mass.
Behr-Manning Division, Troy, N. Y.**

W-926

NORTON ABRASIVES



Every eight minutes **6 Crankshaft Pulleys!**

Production climbed from the day this job was put on a Multi-Au-Matic. On this job, Bullard engineers used two loading stations and double indexing for best results. While the two stations are loaded, the other six are turning out the finished work.

The Multi-Au-Matic replaces several of the old-type machines . . . uses floor space and manpower to maximum advantage. Have you asked for an estimate on your most vital jobs?

BULLARD

THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT



gr
pl
th
dr
fo
fo
ca
th
pu
th
slig
V
sig
sho
ma
an
an
hol
hol
lap
I
the
out
tat
side

We had a considerable amount of grief in our plate department, where plates are laid out for drilling, due to the fact that after the plates were drilled the holes would not line up for assembly. Upon investigation we found that in center-punching the location for holes, the individuals on the layout job were not holding their punches perpendicular to the plates, the result being that the holes were slightly off.

We overcame the difficulty by designing the "toolmaker's punch" shown in the drawing. Part A is made from tool steel, heat treated and ground. Part B is a hardened and ground punch, which slides in the hole in the center of part A. The hole, which is $\frac{1}{4}$ inch diameter, is lapped to a sliding fit.

In use, the punch is lined up with the intersecting lines on the plate layout, the lining-up process being facilitated by a $\frac{3}{8}$ -inch peep-hole on one side and a $\frac{3}{8}$ -inch slot on the other.

The results secured by the use of this tool have been practically 100 per cent.

Auxiliary Small Parts Vise

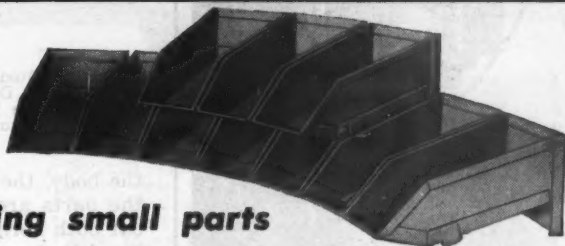
By CHAS. H. WILLEY

FOR hand work on small parts the average bench vise is usually so large as to be cumbersome, yet in many instances it seems to offer the only method by which such parts can be held.

The drawing herewith presents the design of an auxiliary vise for holding small work. The auxiliary vise is intended to be held in the usual bench vise, but can be made small enough to provide a certain amount of sensitivity in the clamping of small pieces. Thus by using such an auxiliary vise not only will the work be saved from damage, but it will hold the work up

NEW BINS

for assembling small parts



Floors slope to feed parts to front — end reaching and fumbling.

All-welded construction.
Rolled, smooth edges.

Bins taper toward front to form convenient semi-circle — keep all bins within easy reach.

Nesting, locking construction for rigid set-ups, easily changed when necessary.

Two sizes — tapered or straight edges.
Hoppers available for steady work.

Write Stackbin Corporation, 53 Troy St., Providence, R. I., for further details and low prices.

STACKBIN



SYSTEM

"Stacked and
Still Accessible"

STACKBIN CORP., Providence, R. I.

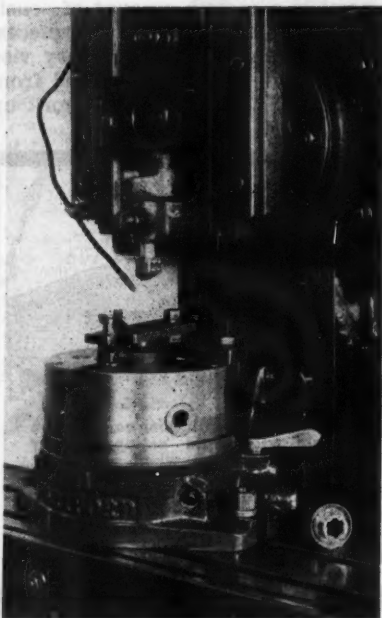
Hartford

'SUPERSPACER'

for Versatile Spacing

Very accurate multi-splines are being slotted in heat-treated steel in this illustration. A special holding fixture is mounted on the face of the chuck.

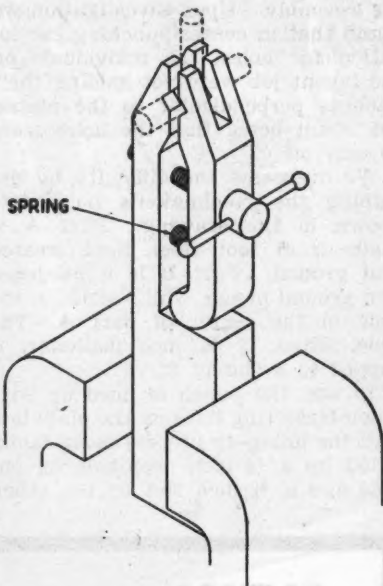
The HARTFORD "Superspacer" is more rigid and more rapid in operation than the conventional dividing head. It can easily be set up for one piece or thousands. Interchangeable mask plates make errors impossible on divisions of 2, 3, 4, 6, 8, 12, 24. Write for complete specifications and illustrations of milling, drilling, grinding, jig boring, planning, slotting and boring operations.



**THE HARTFORD
SPECIAL MACHINERY CO.**
HARTFORD • CONNECTICUT

closer to the eyes, and the auxiliary vise can be operated much faster than the regular vise.

The auxiliary vise has three parts;



Drawing of Auxiliary Vise for Holding Small or Light Work. Dotted Lines Show Manner of Holding Round Work Vertically and Horizontally

the body, the jaw, and the screw. All the parts are of simple design. Vees cut both horizontally and vertically in the jaw faces provide for holding ir-

GEARS

GOOD GEARS ONLY

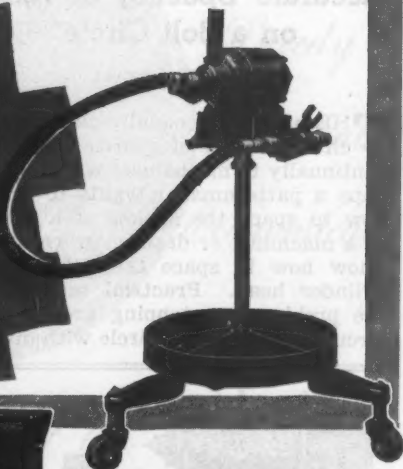
All Kinds—Any Quantity

AT THE RIGHT PRICE

THE CINCINNATI GEAR CO.
Weester Pike Cincinnati, Ohio

The handiest time and
labor saving **POWER TOOL**
for many jobs

SIoux **DIRECT DRIVE** **FLEXIBLE** **SHAFT**



Portable—takes the tool to the work.

Light, compact, easy to handle—conserves energy—increases production.

Enables operator to easily get at places usually difficult to reach.

Smooth, efficient, speedy in operation . . . Turns out finest grade of work quickly . . . Built for long, hard service.

Write for Complete
Details or Ask Your
SIoux Distributor

No. 1020 $\frac{1}{2}$ H. P. stationary motor, 1725 R. P. M. Ideal for *Tire Shops* with attachments shown above.

No. 1009 $\frac{1}{4}$ H. P. or No. 1027 $\frac{3}{4}$ H. P. motor which swivels and tilts. Especially designed for *Body Shop* sanding and grinding (see photo at right)



STANDARD THE

WORLD OVER



regular or cylindrical-shaped work. The screw would be more efficient if made with a square thread, but an ordinary V-thread will serve very well. A spring should be provided between the jaws to spring them open when the moveable jaw is released.

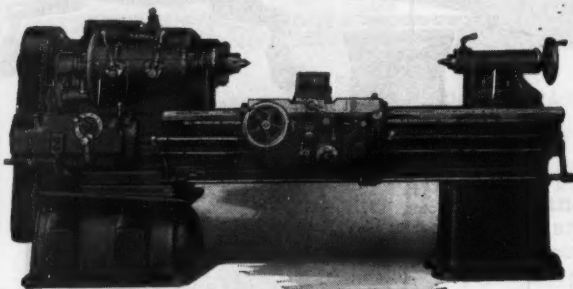
Accurate Spacing of Holes on a Bolt Circle

By W. S. HASKELL

THE problem of equally dividing the circumference of a circle comes up continually in mechanical work. Perhaps a patternmaker wants to know how to space the spokes of a wheel or a machinist or draftsman wants to know how to space the holes on a cylinder head. Practical men solve the problem by stepping around the circumference of the circle with divid-

ers, although they often have difficulty in setting the dividers to a reasonably correct trial pitch distance and then have to adjust them so that the holes "come out right." Troubles increase with the number of holes, especially if there are an odd number, so that the circumference cannot be quartered or otherwise divided to locate the spacing of some of these holes.

An application of trigonometry offers a solution to this problem. Since the holes are equally spaced on the circumference of a circle, 360 divided by the number of holes will give the number of degrees in the angle formed by two lines connecting adjacent holes with the center of the circle. A straight line connecting the center of these adjacent holes is a chord the length of which is the pitch of the holes and which it is desired to determine. If the sine of one-half the angle is multiplied by the diameter of



Engine Lathes

THE BOYE' & EMMES MACHINE TOOL CO.

CINCINNATI

BIRMINGHAM.....Pratt & Whitney Co.
BOSTON.....Pratt & Whitney Co.
CHICAGO.....R. S. Dean Co.
CINCINNATI.....Pratt & Whitney Co.
CLEVELAND.....Pratt & Whitney Co.
DETROIT.....D. E. Morand Machinery Co.
DULUTH.....W. P. & R. S. Mars Co.
GRAND RAPIDS.....Joseph Monahan
HARTFORD.....Pratt & Whitney Co.
HOUSTON.....Huge-Payle Supply Co.
LOS ANGELES.....Pratt & Whitney Co.

OHIO

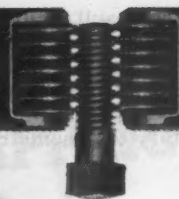
MILWAUKEE.....Nichol Machinery Co.
NEW ORLEANS.....Woodward, Wight & Co., Ltd.
NEW YORK CITY.....Pratt & Whitney Co.
PHILADELPHIA.....Pratt & Whitney Co.
PITTSBURGH.....Rees Machinery Co.
RICHMOND.....D. E. Parker
ROCHESTER.....Pratt & Whitney Co.
ST. LOUIS.....Pratt & Whitney Co.
SAN FRANCISCO.....Pratt & Whitney Co.
SEATTLE.....Buckner-Weatherby Co., Inc.
TOLEDO.....Frank D. Lake Co.

Canadian Representative: Moore Bros. Mach'y Co. Ltd., Montreal

ficul-
rea-
tance
that
ubles
s, es-
mber,
ot be
o lo-
these

y of-
Since
a the
vided
e the
orm-
acent
e. A
er of
the
the
eter-
an-
er of

NOW-YOU CAN GET



for
Speedy
Accurate
Economical
"in process"

Greenfield
John-Sons
ROLL THREAD SNAP GAGES



GREENFIELD TAP AND DIE CORPORATION

GREENFIELD, MASSACHUSETTS

DETROIT PLANT, 3816 Second Blvd.

WAREHOUSES in New York, Chicago, and Los Angeles

In Canada: GREENFIELD TAP AND DIE CORP. OF CANADA, LTD.,
GALT, ONT.

Gaging of Threaded Parts

Here's good news indeed for all makers of threaded parts.

The Roll Thread type of Snap Gage is ideal for gaging work on the machine. Its open end construction permits rapid application of the gage to the threaded part. The rotating rolls increase the life of the gaging ribs and the effective life of the gage.

Now you can get Roll Thread Snap Gages from "Greenfield," the source you've always looked to for quality gages to guard the accuracy of your product. Send at once for descriptive booklet, giving complete information, and instructions for ordering Roll Thread Snap Gages.

GTD GREENFIELD
TAPS • DIES • GAGES • TWIST DRILLS • SCREW PLATES

the circle, the result will be the required pitch or distance to set the dividers to step off the holes.

This calculation seems simple and is easily understood by one familiar with elementary trigonometry, but the

A special table of sines has been published giving those most frequently used for decimal parts of degrees instead of giving the angles in minutes as is usually done. Most practical men prefer not to use a book at all, so a diagram is presented by which the length of the sides of various inscribed polygons can be determined by geometrical methods, using a straight edge and dividers.

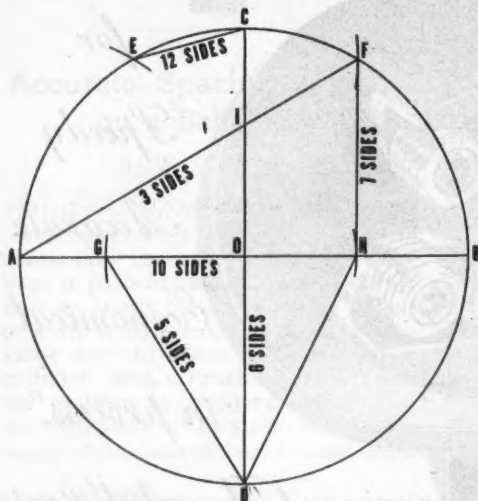


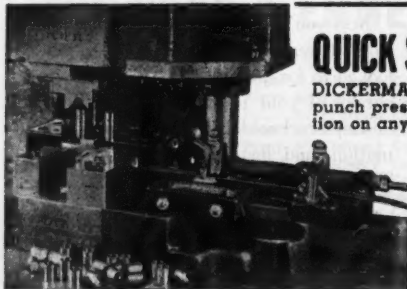
Diagram for Finding Length of Sides of Various Polygons; For Exact Spacing of Holes in Bolt Circles

difficulty consists in converting the answer from a decimal to the English system of a machinist's scale and also in converting the decimal parts of a degree to minutes of the sexagesimal system used in the table of trigonometric functions.

Draw a circle of the required radius. As is generally known, the radius of the circle is the length of one side of an inscribed hexagon. Lay off this radius from A to E and from E to F. Bisect OB at H and connect H and F. Draw HD and make HG equal HD. Then HF is the side of an inscribed polygon with 7 sides. DG is the length for a pentagon or figure with 5 sides, and GO is the length for 10 sides. 10 minus about $1/42$ of its length is the length for an eleven sided inscribed polygon. Several other chord lengths are shown in the drawing.

Another way to get the lengths of chord for a 7-sided polygon is to drop a perpendicular from the center of one side of an inscribed hexagon to the center of the circle. The length of this line is the required dimension.

With the aid of the diagram shown and a little stepping with dividers, it



QUICK SET-UPS ON ANY PUNCH PRESS

DICKERMAN Hitch Feeds are adaptable to any ordinary punch press without press alterations. Feeds from any position on any style die... from zero to its limit (2" on 2" Hitch Feed and 4" on 4" Hitch Feed) for each stroke of the press.

Quick set-up... economical for short runs.

Write for Folder No. 84.

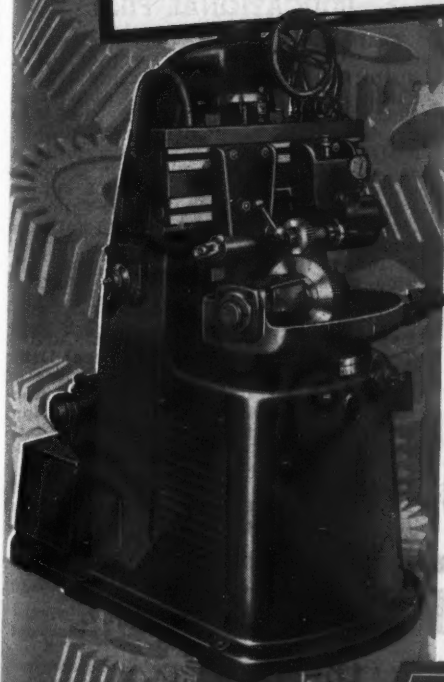
H. E. DICKERMAN MFG. CO.

321 Albany St.

Springfield, Mass.

RED RING LAPPING

*is Fast, Accurate
and Economical*



When gear specifications require lapping, or in cases where fire distortion errors are encountered, the RED RING Crossed Axes Rotary Lapping process will be found outstanding in effectiveness, speed and economy. Lapping by this process acts on the tooth surface in two directions simultaneously and over the entire surface with uniform intensity.

RED RING lapping is applicable to spur gears, helical gears, cluster and shoulder gears. Either the cramp action or power tailstock process is available for high or low involute teeth and ELLIPTOID teeth.

The RED RING Gear Lapping Machine is fully automatic and adjustable and therefore does not require a skilled operator. The time cycle may be set so that more stock may be removed from one side of the teeth than the other.

Write for descriptive bulletin.

**NATIONAL BROACH
AND MACHINE CO.**

RED RING PRODUCTS

5600 ST. JEAN - DETROIT, MICH.

SPECIALISTS ON SPUR AND HELICAL
INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORMS

is possible to divide a circle without much figuring. If dividers are hard and sharp, it is possible to go around without making any punch marks.

If the required number of holes is a multiple of 2, a little difficulty is encountered. The points where the quarter lines of the circle intersect the circumference, if connected, form an inscribed square. If the arc subtended by the side of an inscribed square is bisected, the length of chord

to draw an inscribed octagon may be obtained. The diagram is especially useful in the shop, as usually the foremen do not like to have the men make lengthy computations.

To obtain the length of chord to space 15 holes on a circle, subtract the arc subtended by the chord of an inscribed regular decagon from the arc of a hexagon and draw the chord. ($1/6$ minus $1/10$ equals $1/15$.)

The construction shown is not found in text books on geometry.



DUSTKOP

Dust Collector has it.

Model 1250 DUSTKOP (illustrated) and Model 600 are designed especially to save space. DUSTKOPS can usually be mounted behind the dust creating machine, or suspended overhead, or placed under the workbench without interrupting operations. Ideal for small or large grinders and buffers; tool, cutter, surface and internal grinders. Operated by G. E. (or equal) continuous duty motor and fan. Prompt deliveries on high priorities.

Aget-Detroit Co.

2046 Beek Bldg.

Cadillac 3090

Detroit 26, Mich.

EDUCATIONAL FILMS

Castle Films 16 MM. Sound Motion Pictures. Castle Films, Inc., with offices at 30 Rockefeller Plaza, New York, N. Y.; Field Bldg., Chicago, Ill., and Russ Bldg., San Francisco, Cal., now has available a 20-page illustrated catalog, designated as the No. 1, describing a series of 16 mm. sound motion pictures on machine shop work and shipbuilding. Produced by the United States Office of Education, these films cover 48 subjects which are divided up into groups headed as follows: Precision Measurement; Engine Lathe; Milling Machine; Vertical Boring Mill; Shaper; Radial Drill; Shipbuilding Skills; Bench Work; Action, Use and Care of Single Point Cutting Tools; Sensitive Drill, and Vertical Drill.

Catalog No. 1 explains the purpose of the films and their outstanding effectiveness in helping to speed production, and lists prices and lengths. Also available from Castle Films are folders describing 16 mm. sound films produced by U. S. Office of War Information, U. S. Department of Agriculture, and National Film Board of Canada.

"OUTWEARS

the best

Bronze Metal"

20 years



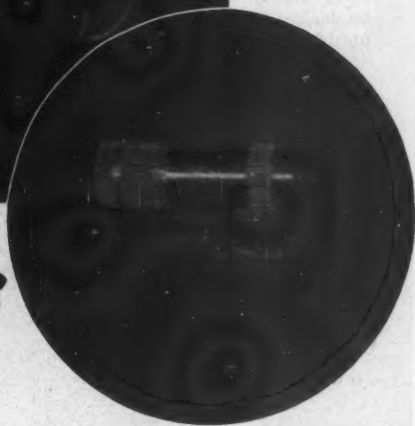
without
a drink—

ARGUTO OILLESS BEARING CO.

Wayne Junction, Philadelphia, Pa.



*.. as for
Aircraft*



Shaved Gears

FOR TANKS

Widely regarded as a "pilot" plant in the production of specialized precision gears for tanks is the Mack Manufacturing Company.

Even though the accuracies and finish required in gears for such vehicles far exceed normal requirements—Mack is doing an outstanding job in producing such gears by mass production methods, employing Michigan gear

shaving, gear lapping and gear checking equipment. Finished on the Michigan 860 rotary machines at Mack are both shaper cut and hobbled gears as well as involute splines.

It makes no difference to a precision gear shaver whether the gear it finishes is for a tank, for a boat or for an aircraft engine.

Ask for the new 32-page Gear Finishing manual GF-43



MICHIGAN TOOL COMPANY

7171 E. MCNICHOLS ROAD . . DETROIT 12, U. S. A.

GET THOSE INSIDE DIMENSIONS QUICKLY AND ACCURATELY WITH A **LUFKIN** TELESCOPING GAGE

With the aid of a Lufkin telescoping gage you can quickly and easily determine the inside diameter of slots or holes to within one-thousandth of an inch. On this precision tool, plungers are under constant spring tension and a slight turn of the knurled handle locks the plungers. Unlike other similar tools, handle can be locked in center of plungers assuring perfect balance.



Available singly or in sets of six in an attractive red leather case. Lufkin Telescoping Gages measure diameters from $\frac{5}{16}$ " to 8". See your dealer or write today for Lufkin Catalog 12-C illustrating the complete line of Lufkin tapes, rules and precision tools.

**BUY THROUGH
YOUR DISTRIBUTOR**

THE LUFKIN RULE CO.

TAPES • RULES • PRECISION TOOLS
SAGINAW, MICHIGAN NEW YORK CITY

CONTROLLED CONSTRUCTION
 assures superior quality and
 extra long service *in all-*

CLARK

HEAT
TREATED
GEARS

PRECISION
BALL
BEARINGS

CAREFUL
INSPECTION
OF PARTS

MAXIMUM
INTERCHANGE-
ABLE PARTS

CLARK
UNIVERSAL
MOTORS

AIR SEALED
COMMUTATOR
CHAMBER

The James Clark Jr. Electric Company
 are also manufacturers of grinders
 and sanders. These, too, are pro-
 duced under the Control Construction
 Method.

Since 1892 when Clark first started
 manufacturing electric tools, con-
 stant field tests plus long engineer-
 ing experience have resulted in that
 they can proudly say, "First in The
 Field — First With Portable Drills,
 First With Improvements, First in
 Quality."

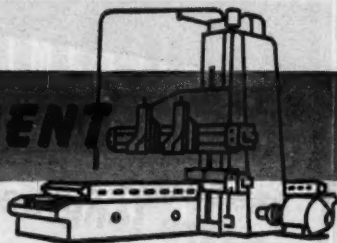


JAS. CLARK JR. ELECTRIC CO.

606 BERGMAN ST.

LOUISVILLE, KENTUCKY

NEW SHOP EQUIPMENT



Barnes 445 Two-Spindle Deep Hole Cylinder Boring Machine

Marketed by the W. F. & John Barnes Co., Rockford, Ill., the Barnes 445 Two-Spindle Deep Hole Cylinder Boring Machine shown herewith is said to be particularly useful in boring airplane landing gear struts and recoil cylinders. The design of the unit permits two parts to be bored simultaneously in completely independent cycles. Each workpiece is driven by an independent headstock and is supported by a separate adjustable three-point roller steady rest which is equipped with Timken roller bearings and is adjustable for accommodating work from 5 to 16 inches in diameter.

The base of the machine is cast in two sections, with three ways running full length. The head section of the base has T-slots milled into the center way for clamping the headstocks, steady rests, and tool guide bushing brackets. All way-mounted members are clamped to the outside ways by gibs bolted to the underside of each member.

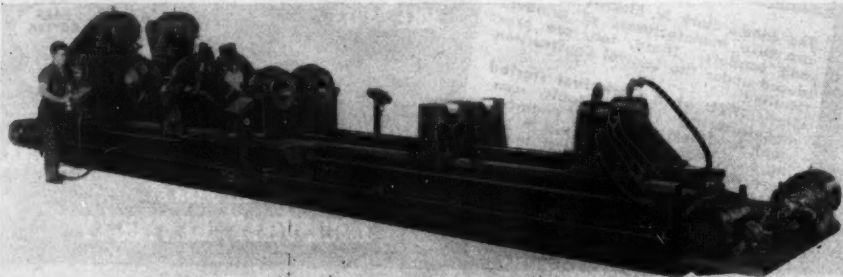
Tools are fed by independent hydraulically-actuated slides. The heads are fitted with spindles having a 6¼-inch hole and 15-inch American standard lathe spindle nose with holes to suit 21 or 24-inch four-jaw independent chucks or 21 or 24-inch three-jaw scroll chucks.

A rough V-locator, which is moved by a hand crank, is incorporated into the design of each steady rest to provide support for the workpiece when loading and unloading and to prevent possible damage to the rollers or steady rest through careless handling. The top portion of each steady rest is hinged to facilitate handling of the part.

Toolholders are bored to accommodate boring bars up to 6 inches in diameter and are mounted on accurately machined ways together with bar supports which are positioned midway between the toolholders and the tool guide bushing brackets. During the operation of the machine, the bar supports remain stationary until the toolholders have been fed forward to meet them. The bar supports are then moved along the ways until the boring cycle is completed. When the toolholders are traversed to the starting position, the bar supports are returned to their original position by a latch on each toolholder controlled by dogs clamped to the center way.

Two motor-driven hydraulic units mounted at the head end of the machine actuate the hydraulic feed cylinders located in the base. The feed of each spindle and hydraulic unit may be completely controlled from either of the two push-button stations on corresponding sides of the machine. Either spindle or

Barnes 445 Two-Spindle Deep Hole Cylinder Boring Machine



hydraulic unit may be stopped from any one of the four control stations.


Each spindle unit has its own motor-driven high pressure coolant pump. Coolant stored in the base is pumped through telescoping pipes located at the sides of the machine and to the tools through short lengths of flexible hose. Removable chip baskets and chip chutes are mounted on the tool guide bushing brackets.

Specifications of the Barnes 445 Two-Spindle Deep Hole Cylinder Boring machine are as follows: stroke, 12 feet; swing, 25 inches diameter; maximum length of part handled, 67 inches; maximum boring diameter, 14 inches; bar size, guide bushing 12 inches maximum, pilot 6 inches maximum; spindle centers, 26 inches; spindle height from ways, 20 inches; spindle hole, $6\frac{1}{4}$ inches diameter; spindle nose flange, 11 inches diameter; spindle speeds, 18 to 295 r.p.m. standard, 4 to 60 r.p.m. optional; feed rate, $\frac{1}{8}$ inch per minute minimum, $7\frac{1}{2}$ inches per minute maximum; traverse rate, (forward) 90 inches per minute, (return) 80 inches per minute; motors for spindles (two), 15 h.p. 1,200 r.p.m.; motors for hydraulics (two), 5 h.p. 1,200 r.p.m.; motors for coolant pumps (two), 10 h.p. 1,200 r.p.m.; weight skidded, approximately 68,000 pounds.

Fitchburg Type "B" 6-Inch Plain Cylindrical Automatic Precision Grinder


The Fitchburg Type "B" 6-Inch Plain Cylindrical Automatic Precision Grinder illustrated herewith is designed to include features that are said to provide for the accurate and fine finishing of plain cylindrical parts in both small lots and on a production basis. The machine is equipped with a standard Bowgate wheelhead, the spindle of which is ground and lapped to a mirror finish. The spindle operates in special lead bronze bearings which are adjustable for wear and bored to close limits, thus providing a minimum of clearance for the use of low viscosity lubricants. In this manner, radial spindle movement is said to be eliminated, thereby allowing for accurate work size duplication.

The wheelhead and table of the machine operate on large V and flat ways. A unique spring tension method of wheel feed is claimed to completely eliminate the need for feed screws, bearings, and joints. This feed method is said to provide a vertical to horizontal ratio of ap-



NO-DUST GRINDERS

PATENT PENDING



FRONT

REAR VIEW

SAVE 50% FLOOR SPACE

REQUIRES ONLY $6\frac{1}{2}$ SQUARE FEET
COMPLETELY SELF-CONTAINED
GRINDER AND DUST COLLECTOR

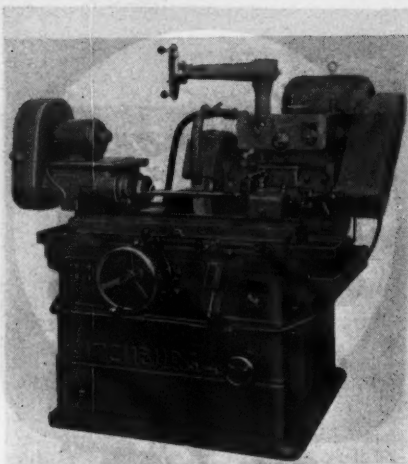
All-In-One Compact Unit

3 POPULAR SIZES FOR 10" - 12" - 14" WHEELS
WRITE FOR BULLETIN SP-13

ALSO: Carbide Grinders; Cylindrical Finishing
Machines; Abrasive Belt Surfactors; Polishing
Lathes and Rotary Automatics



1615 DOUGLAS AVENUE
Eastern branch—71 West 23rd St., New York 10, N. Y.



Fitchburg Type "B" 6-Inch Cylindrical Automatic Precision Grinder

proximately 250 to 1, thus assuring accuracy of control to 0.0001 inch.

The automatic cross feed of the Fitchburg Type "B" 6-Inch Cylindrical Grinder is a continuous infeed which may be

used for plunge cut grinding or table traverse work. The traverse gearbox is anti-friction bearing equipped and is provided with hardened and ground parts running in oil.

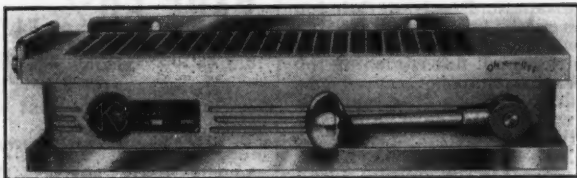
The variable speed control of the Type "B" 6-Inch is operated by rotating a small handwheel located at the front of the grinder, the variable speed pulleys between the motor and the speed reducing unit swinging on the pivot arm either toward or away from the motor, thus increasing or decreasing the table speed steplessly from zero to maximum. All controls of the machine are conveniently located at the operator's finger tips. The unit construction of all sub-assemblies is said to make maintenance and adjustments quick and easy.

The Fitchburg Type "B" 6-Inch Plain Cylindrical Automatic Precision Grinder is available in two sizes with capacities of 6 x 18 and 6 x 32 inches.

Benchmaster Improved Vertical Bench Milling Machine

An improved vertical bench milling machine with quick-change attachment for horizontal milling is announced by

KAR Permanent Magnet CHUCKS



Cannot Fail
Hold Work Tight
Generate No Heat

An outstanding and exclusive advantage of the KAR Permanent Magnet Chuck is its ability to hold smaller pieces securely due to the close spacing of the pole pieces.

Release Easily
Used Wet or Dry
Use No Power



THE KAR ENGINEERING CO., Inc.

GREAT BARRINGTON

MASSACHUSETTS

table
box is
and is
ground

e Type
ting a
front of
pulleys
reduc-
t arm
motor,
e table
imum.
conve-
finger
all sub-
enance

Plain
grinder
facilities

tical

millings
ement
ed by

y
ry
r

C.
SETTS

1943



Bullets BY THE Billion

THIS SPECTACULAR anti-aircraft fire, above a city near the battle front, presents a graphic picture of our Armed Forces' expenditure of bullets literally by the billion . . . and brings home to all the need for faster and more efficient machining.

In getting the most out of machine tools and cutters, drills, reamers, boring bars, grinding wheels, etc. in producing not only bullets, but guns, planes, tanks, ships and countless other weapons, plants everywhere are using *Texaco Cutting and Soluble Oils*.

Texaco Cutting Oils, for example, lubricate tools, carry away the heat and prevent chip welding. Their use assures improved

surface finish and maximum output per tool grind.

Texaco lubricants have proved so effective that they are definitely preferred in many important fields.

A Texaco Engineer specializing in cutting coolants will gladly cooperate in the selection of the correct grades of *Sultex*, *Transultex*, *Cleartex*, *Almag*, *Britex* or *Soluble Oils* for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

★ ★ ★

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Tune in The Texaco Star Theatre every Sunday night C.B.S.

★ Help win the war by returning empty drums promptly

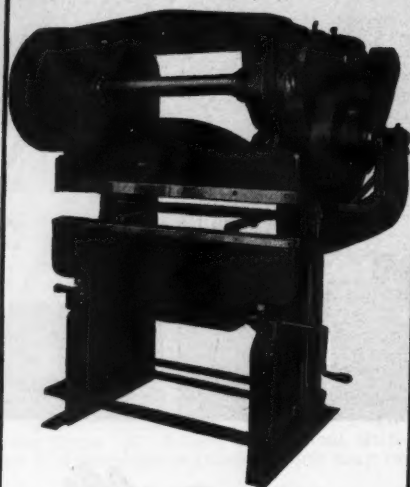


TEXACO Cutting and Soluble Oils

FOR FASTER MACHINING

CHICAGO STEEL PRESS

No. 253



SPEED WAR PRODUCTION OF SHEET METAL WORK

USE FOR...

1. FORMING
2. EMBOSHING
3. MULTIPLE PIERCING
4. NOTCHING
5. BLANKING

of Ammunition Cases, Bomb Box Liners,
Bomb Fins, Aircraft Parts and Many
Other Offense Products.

The No. 253 CHICAGO STEEL PRESS
is accurate, compact, and ruggedly
constructed of highest quality materials.
Sizes 4, 5 and 6 ft. capacities up to 10
gauge.

Write for Circular No. 255

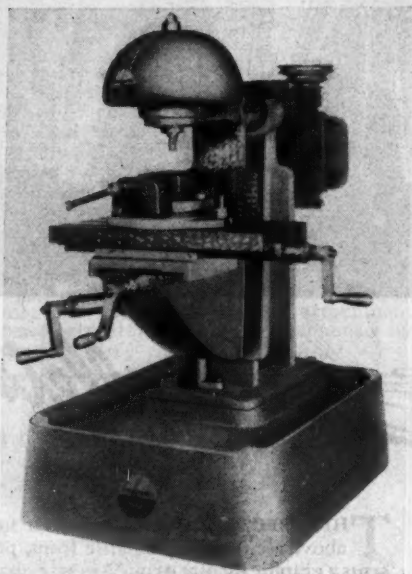
**DREIS & KRUMP MFG.
Company**

7418 LOOMIS BLVD.

CHICAGO 36

ILLINOIS

the Benchmaster Tool Co., 2952 W. Pico,
Los Angeles, Cal. The 2½-inch diameter
arm supporting the spindle head is
clamped rigidly to the column and can
be readily adjusted so as to rotate the
spindle up to 60 deg. either side of center.
Or, the entire head can be easily
removed and replaced with an enclosed
horizontal milling attachment. In this
manner, a variety of operations, such as
precision diemaking, diesinking, profil-
ing, jig boring, key slotting, and so on,
can be performed on the machine.

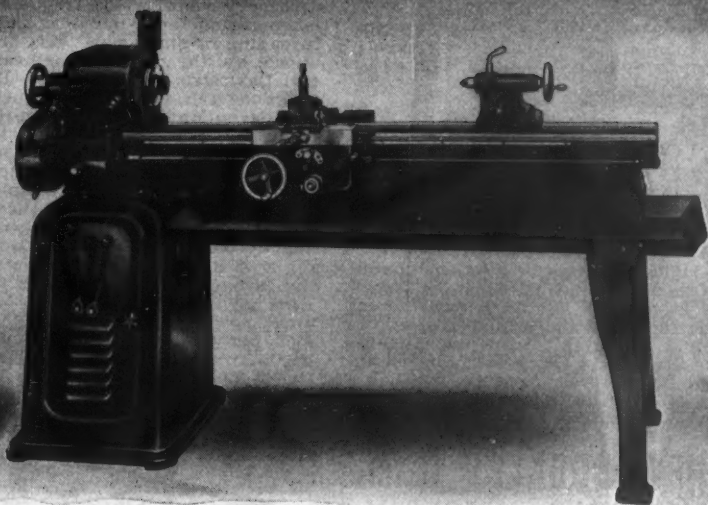


Benchmaster Improved Vertical Bench Milling
Machine

Compactly designed, the Benchmaster
Improved Vertical Bench Mill is 30 inches
high and is equipped with a precision
ground 6 x 14-inch table having three
¾-inch T-slots located on 2-inch centers.
Micrometer adjustments for table move-
ments are operated by convenient splined
disengageable hand cranks, while gradu-
ated dials reading in thousandths of an
inch provide for easy and accurate re-
setting of table.

Additional features of the machine in-
clude a streamlined enclosed spindle
guard and sturdy sub-base which affords
mill with suitable working height for
convenient operation as well as maxi-

SHELDON

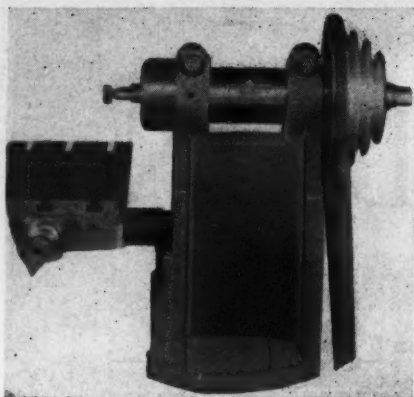


Sheldon BBU-1240 WQ Precision Lathe

This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate through a standard 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC., 4250 N. Knox Ave., Chicago, U. S. A.



Close-Up View of Horizontal Milling Attachment of Benchmaster Vertical Bench Mill

mum rigidity. According to the manufacturer, proper tension on V-belt at all times is assured by a floating motor mount, the design of which also allows for rapid changing of the four spindle speeds (450, 850, 1,400, 2,100 r.p.m.) without the use of tools. The spindle has a

No. 2 Morse taper and is driven by a $\frac{1}{2}$ h.p. motor.

Logan No. 280 Quick Change Gear Lathe

Designated as the No. 820, a quick change gear lathe which is said to be especially useful where frequent changes in operating feeds must be made in the threading of small parts has been introduced by the Logan Engineering Co., 4901 Lawrence Ave., Chicago, Illinois.

Simple and foolproof in operation so that even inexperienced workers can quickly learn to operate it, the quick change gearbox provides for 48 threads and feeds in either direction to the carriage of the lathe. By simple adjustment of two levers, screw threads from 8 to 224 per inch are quickly available, and by changing the 24-tooth stud gear for a 48-tooth stud gear furnished with the lathe, additional threads from 4 to 7 per inch can be cut. Similarly, longitudinal power feeds from 0.0015 to 0.1000 inch per revolution of the spindle may be obtained. Power cross feeds are 0.25 times the longitudinal feeds. The entire

NEW BOOKLET Describes LIGHTWAVE MEASUREMENT

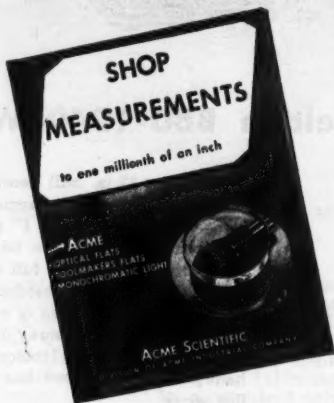


IT'S YOURS FOR THE ASKING!

Just off the press . . . Acme's new booklet "SHOP MEASUREMENTS to one millionth of an inch," describes in simple detail how Acme Optical Flats are applied in the procedure of lightwave measurement.

Illustrations and diagrams show how these flats can be used to check surface flatness, as well as their use for accurate comparison measurement in connection with precision gage blocks.

In short, this new booklet has been written in non-technical terms to make it easy for the average mechanic to thoroughly understand how to apply lightwave measurement in shop practice.



Write for Your Copy Today . . .



ACME INDUSTRIAL COMPANY

Makers of Standardized Jig and Fixture Bushings

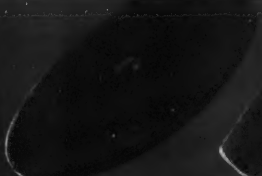
212 N. Laflin St.

Chicago, Ill.

MONroe 4122



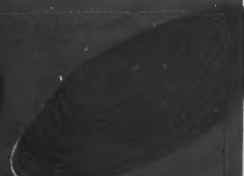
Three-Mile Cloth
Extension Bands



Overlapping-Slotted Disk-Tro-Cut
Three-Mile Cloth Discs



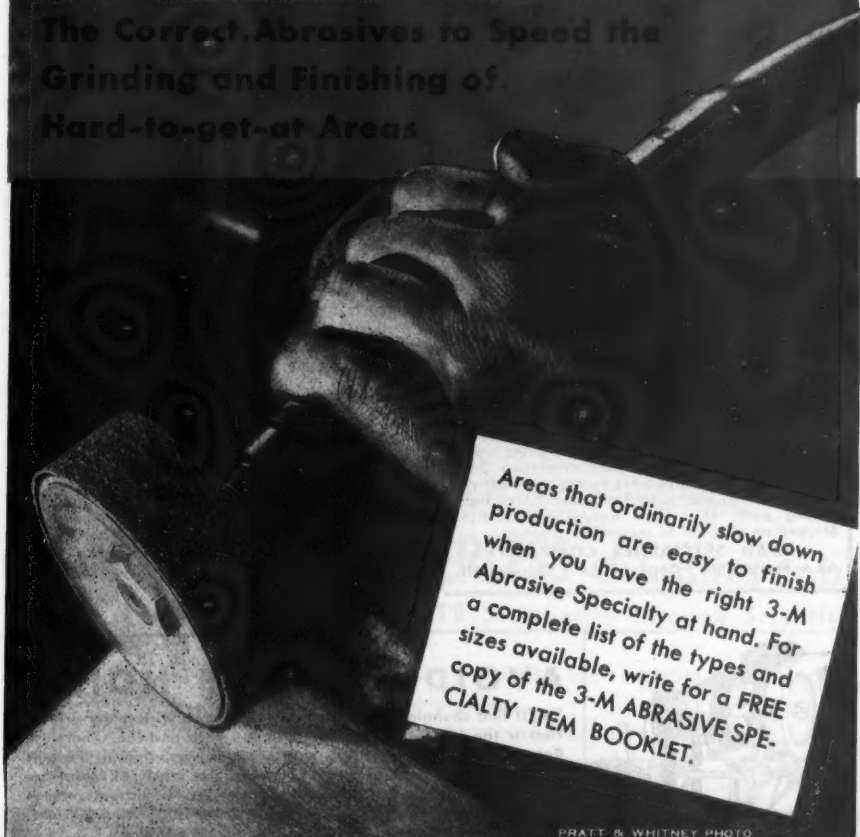
Disk-Tro-Cut Three-Mile Cloth
Cartridge Rolls



Three-Mile Cloth
Tapered Disc Sets

3-M ABRASIVE SPECIALTY ITEMS

The Correct Abrasives to Speed the
Grinding and Finishing of
Hard-to-get-at Areas



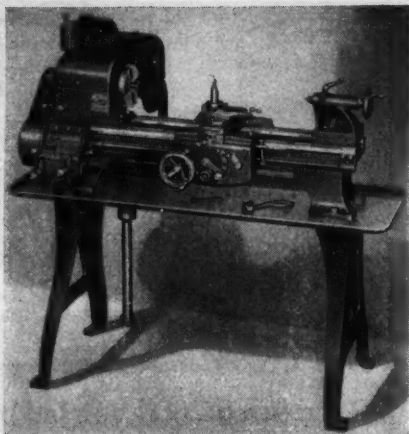
Areas that ordinarily slow down
production are easy to finish
when you have the right 3-M
Abrasive Specialty at hand. For
a complete list of the types and
sizes available, write for a FREE
copy of the 3-M ABRASIVE SPE-
CIALTY ITEM BOOKLET.

PRATT & WHITNEY PHOTO

MINNESOTA MINING & MFG. CO. SAINT PAUL 6, MINNESOTA

assembly is sturdy and accurate, with precision cut steel gears and self-lubricating bearings. The index plate which guides the operator in making gear changes is legibly marked.

Another feature of the Logan No. 820 Lathe is an automatic apron which operates from a spline in the lead screw through a worm drive and friction clutch for both longitudinal and cross feeds. For cutting threads, an additional long-



Logan No. 820 Quick Change Gear Lathe

ANNOUNCING "AIR-CLAMP"

For Greater Drill-
Press
Output



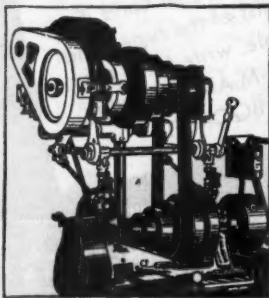
Wherever a drill comes down, something must hold the work. Whenever a drilling-jig is required, Air-Clamp will simplify it. Whenever speed is desired, Air-Clamp will produce it. Air-Clamp holds with relentless pressure; is undisturbed by size variations (such as in castings), it scoffs at vibration (how many drills have been broken due to faulty hold-downs?), chatter, snagging. Air-Clamp holds work of any size or shape in any position, at any angle. It can pay for itself on a single fixture; it can save its cost on a few days' drill-press output. Reduces operator-fatigue. Saves hours and dollars in drafting room, jig department, tool room and production line. Air-Clamp fits any drill-press having a cylindrical column. Special fixtures for Tee-slotted tables, light milling work, etc. Hand and/or foot control. Shipped on approval to responsible concerns.

MEAD SPECIALTIES COMPANY

15 S. Market St. Dept. 93-AA Chicago, Ill.

itudinal drive operates from half nuts on the lead screw. According to the manufacturer, a safety feature, especially provided for inexperienced operators, makes it impossible to engage both drives at the same time. Worm and gear operate in a bath of oil, which feature, together with the use of steel cut gears and sturdy overall construction, is said to assure extremely long-lasting performance of the apron.

Other features claimed for the Logan No. 820 Quick Change Gear Lathe include pre-loaded ball bearing headstock which provides sustained spindle accuracy; patented three-point suspension of countershaft which eliminates vibration even at high speeds; and a heavy, well-ribbed bed with precision ground V and flat ways. Swing over bed in the No. 820 lathe is 10½ inches. Bed length is 43½ inches, and distance between centers is 24 inches.



AVOID NEEDLESS NOISE.

You'll find changing speeds a noisy operation with many drives. That is the big difference between a Remco and the others. A Remco is quiet. Motor takes hold gradually by slipping the belt—simple friction-clutch action. No clash, no crash, of metal-on-metal. Instead shockless speed changes made without removing tool from cut in most cases. Less down-time, more out-put! Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.



Wheels for any **CENTERLESS** Grinding Job!

There are reasons for BAY STATE Superiority through Scientific Manufacturing Control.

1. FRACTIONAL GRADES — permit a wider range for a more accurate wheel selection.
2. CONTROLLED POROSITY — assures duplication.
3. H9 BOND — offers cooler cutting, greater wheel life, better production.
4. PATENTED INSTRUMENTS — for checking the hardness of grades. *Send for Bulletin.*

BAY STATE

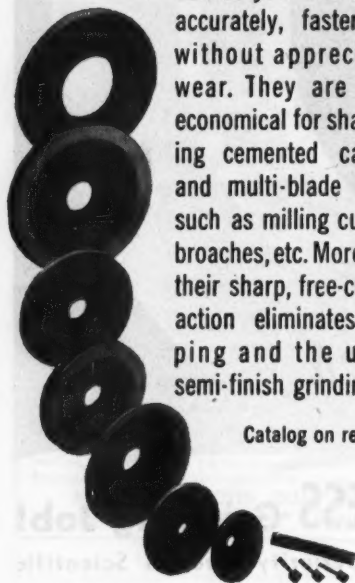
ABRASIVE PRODUCTS CO.,

WESTBORO, MASS. U. S. A.



RESINOID BONDED

DIAMOND WHEELS



can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-blade tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding.

Catalog on request.



Whitcomb Quickcenter

A machine for use in the quick and accurate centering of round bars prior to machining on centers, to be known as the Whitcomb Quickcenter, has been placed on the market by the Whitcomb Mfg. Co., 476 8th St., Troy, N. Y. Designed to enable inexperienced workers to center bars easily and accurately, the machine is operated by placing the work



Whitcomb Quickcenter

on a V-block and turning a handwheel until the work is held firmly between the rising V-block and a lowering button. When tight, the work is in line with the center of the spindle of the machine. Actuation of a hand lever advances the center drill of the unit to the work, thereby properly centering it.

The Whitcomb Quickcenter is equipped with a $\frac{1}{4}$ h.p. motor and has speeds of 700, 1,300, and 2,300 r.p.m., which are adjusted by means of a three-step V-belt sheave. According to the manufacturer, the machine will center round bars from

*It's a
fair
question*

**WHY GET A
WELLS NO. 8?**



WELLS No. 8
Capacity: Rectangle—8" x 16"
(spec. bowed guides)—5" x 24"
Rounds—8" dia.
Speeds: ft. per min. 60, 90, 130
Motor—Specifications optional

Here's why!



No. 20

Designed for cutting
risers & all propeller
blades



No. 12

Heavy duty product-
ion saw



No. 9

General Foundry
Saw



**STOCK
STANDS**

Indispensable item for
your shop

VERSATILE—Wells No. 8 Metal Cutting Band Saw will cut a wide variety of metals in various shapes. In single or ganged-up work it will take overall sizes up to 8" x 16" rectangles or 8" rounds.

ACCURATE—Vibrationless operation assures uniform cutting.

FAST—The continuous cutting method employed insures a cool blade thus enables the operator to obtain maximum cutting speed for the type of stock being cut. Adjustable to 3 speeds.

ECONOMICAL—Cutting capacity and quality are paramount factors in choosing a WELLS Saw. Then too, it requires but a ½ H.P. motor and 2' x 6' of floor space.

Ask your mill-supply dealer to show you a WELLS, Model 8, in actual operation—you'll like its performance.

A large stock of blades is available at all times

To get complete specifications on WELLS Saws, write for the new WELLS Catalog.

Wells Has Established Leadership



WELLS MANUFACTURING CORPORATION

**Wells METAL CUTTING
BAND SAWS**

808 TYLER ST. • THREE RIVERS, MICHIGAN

$\frac{1}{4}$ to 3 inches in diameter within 0.005 inch.

Specifications of the unit are as follows: height, 49 inches; length, 23 inches; width, 13 inches; capacity of V-block, $\frac{1}{2}$ to 3 inches; capacity of (Jacobs) drill chuck, $\frac{1}{2}$ inch; shipping weight, approximately 400 pounds.

Detroit Universal Hook Checker for Thread Milling Cutters

The accompanying illustration shows a universal hook checker for rapidly and accurately checking hook or rake angles and flute spacing in sharpening thread milling cutters which has been announced by the Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich. Visual aligning of a ground straightedge with the face of the cutter flute against an illuminated background permits the operator to read the offset distance directly from an integral micrometer barrel. Simple placement of an indicator finger against the cutting face enables any error of flute spacing to be read directly on an integral indicator dial.

Simple in design, the Detroit Universal Hook Checker has only three princi-

pal components; namely, a base mounted on a pedestal, an adjustable cutter mount with dual head—one for hook and one for space checking—and the hook and flute spacing measuring assembly. The lower cutter mounting center is fixed to the base, and the upper mounting centers are attached to a support which is adjustable vertically to accommodate various lengths of shank type or shell type cutters with arbors.

The measuring assembly in which the ground straightedge finger and the indicator are mounted is provided with a vertical adjustment controlled by a handwheel. The two micrometer barrels which control the movement of the straightedge for right and left-hand offsets respectively are calibrated to measure the offset distance from a radial line. Directly beneath the straightedge is a diffusing glass background illuminated by a lamp in the base. The spacing indicator and its finger are positioned to measure any error of cutting face spacing by comparison with the spacing of a master index plate.

To check a right-hand hook or offset of a cutter face, the "free" upper center is used. The straightedge finger is slid into the flute to the proper depth and locked. With the straightedge of the

REID Hand Feed Surface Grinder No. 2C

A Proven Product for Over a Quarter Century with Thousands in Use Daily

Equipped with Motorized Spindle

Send for Descriptive Literature
EXCELLENT DELIVERIES

Exclusive Selling Agents

H. LEACH MACHINERY CO.

387 CHARLES ST. PROVIDENCE, R. I.
Agents in all Principal Cities Throughout the World



Protect Dead Centers with **DIXON'S** LATHE CENTER GRAPHITE LUBRICANT



And Speed the Job

Read what experienced machine shops write:

"Eliminates burning entirely" • "Am enabled to use centers indefinitely"

"Can increase speeds without undue heating"

DIXON'S Lathe Center Graphite Lubricant is made especially to lubricate dead centers of lathes. It provides effective protection against overheating, softening and scoring. Increases production by permitting heavier cuts and higher speeds. Promotes accuracy by permitting tighter set-up.

Use it also for steady rests, jack screws and other applications where a lubricant of extreme film strength is required.



IN HANDY TUBES

Easy to Apply

1, 4 and 8-oz. at
your regular sup-
plier or write for
printed RLC 2.

I would like to try Dixon's
Lathe Center Graphite Lubricant.
My supply houses are:

NAME

ADDRESS

2

D
JOSEPH DIXON CRUCIBLE CO., JERSEY CITY 3, N. J.

September, 1943

MODERN MACHINE SHOP

229

NEW! SUPER-RESISTANT! REPAIRS or RESURFACES Machine Shop Floors



Here is a new, scientifically developed resurfacing material that will lick the pants off of "floor disintegrators" such as acid, water, oil, grease. Where conditions are such that ordinary concrete won't stand the gaff without plenty of headaches, AWOG solves the problem to a degree never before approached. Aside from its impervious quality, AWOG sets up a smooth, case-hardened surface which is dustless and durable under the most punishing traffic conditions. Withstands grueling loads, steel wheels, hard knocks. Sanitary and easily cleaned because its close knit, non-porous surface cannot harbor germs, filth, or waste matter. AWOG is recommended for new floors; for over-lays over brick, stone, or wood; for repairing or resurfacing areas of any size indoors or out. It offers the utmost economy and trouble-free service to any machine shop or plant requiring a super floor.



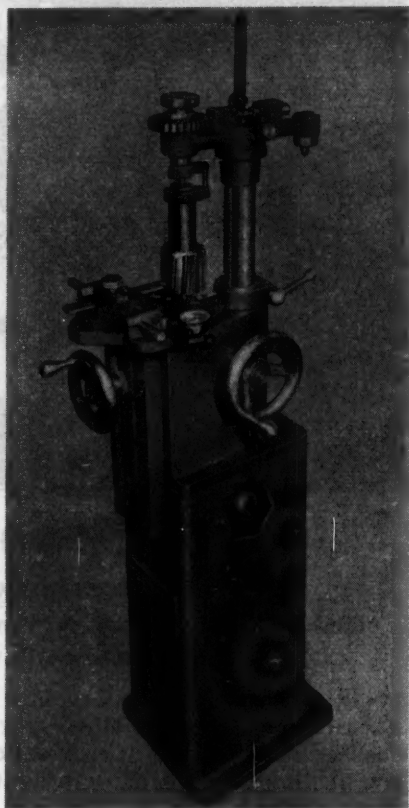
**Write for Further
Details . . .
No Obligation**

FLEXROCK CO.

2315 Manning Street
Philadelphia, Pennsylvania



finger on the center line of the cutter, the right-hand micrometer is backed off and the cutter rotated until the fine light between cutting edge and cutter face just disappears. The reading of the micrometer barrel now corresponds exactly with the amount of offset of the cutter face. To check a left-hand offset,



Detroit Universal Hook Checker for Thread
Milling Cutters

the finger is turned over and the left-hand micrometer is used.

To check flute spacing, the indexing center is used. The bell crank indicator finger is inserted into a cutter flute and the cutter is rotated until the finger engages both the cutter face and the indicator plunger. With the indicator set at zero, indexing the cutter to the next

utter,
ed off
e light
face
r the
is ex-
of the
ffset,

When Factories are Fortresses...

• Cutting tools are the weapons with which weapons are made. • The craftsmen who build National cutting tools ask

you to keep them fighting by keeping them working. Keep them working by keeping them sharp!



NATIONAL



TWIST DRILL AND TOOL COMPANY

HOME OFFICE AND FACTORY—DETROIT, MICH.

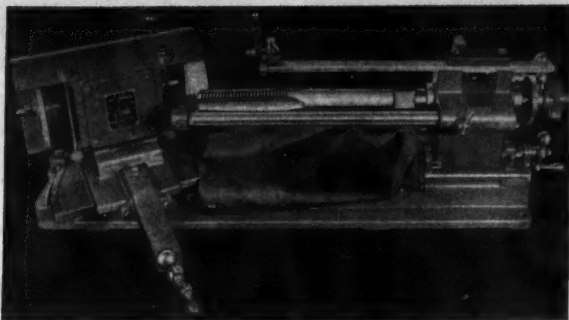
You and the Division of Sales Engineers Co., Cincinnati, Ohio.

STANDARD DRILLS
STANDARD REAMERS
MILLING CUTTERS
COUNTERBORES
SPECIAL TOOLS

Fig. 1—Blake No. 2 Tap Grinder

flute will indicate any error in spacing.

The Detroit Universal Hook Checker can be used to check both shell and shank type thread milling cutters from $\frac{1}{2}$ to $6\frac{1}{2}$ -inch outside diameter and up to 12 inches in length (including arbor mount for shell types). All cutting faces up to 7 inches of flute length can be inspected at all points for accuracy and uniformity of grinding.



Blake No. 2 Tap Grinder

The Blake No. 2 Tap Grinder shown in illustration Fig. 1 herewith, product of the Edward Blake Co., 634 Commonwealth Ave., Newton Centre, Mass., is designed for sharpening chamfers on taps from No. 0 to 2 inches and up to 14 inches long. The machine is similar

in construction to the Blake No. 1 Tap Grinder except that the bed casting is longer to allow for handling of taps of greater length.

The segment under the wheel head slide is of ample width to permit the head to be swiveled for chamfer angle, either in the conventional manner or around to the back of the work as shown in illustration Fig. 2. The latter arrangement is said to be particularly useful in sharpening shell type taps or taps with long pilots, since the work must clear the wheel head, yet be rigidly supported.

MILL STEEL with CARBIDES? Common as an old shoe for

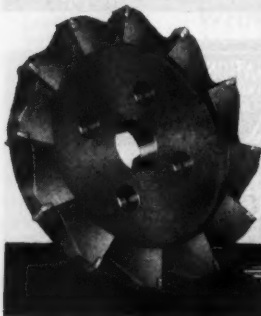
A once difficult problem is licked for all time by the new steel-cutting Cal-Cutters! These mills are specially designed for the job...not an experiment but proven by successful operation in dozens of plants!

Cal-Cutters

What's their advantage? Plenty! You get greatly increased output with lower per-piece cost. You get smoother finish, less down-time for sharpening or replacements. Furthermore, you DON'T need special machines to use Cal-Cutters—they've been designed to operate at maximum efficiency on any standard modern mill!

Cal-Cutters are heavily built, with extra strength and stock to back up generously sized carbide tips. They're built to take it and keep on producing when ordinary cutters call it quits.

Write for the new Cal-Cutter "Catalog M-1" showing a partial list of standard and special models. Cal-Cutters are made or will be built to order for any milling requirement. Send designs for quotation.



MACHINERY MANUFACTURING COMPANY

Vernon Line of

HORIZONTAL MILLS, VERTICAL MILLS and JIG BOERS, SHAPERS and GRINDERS

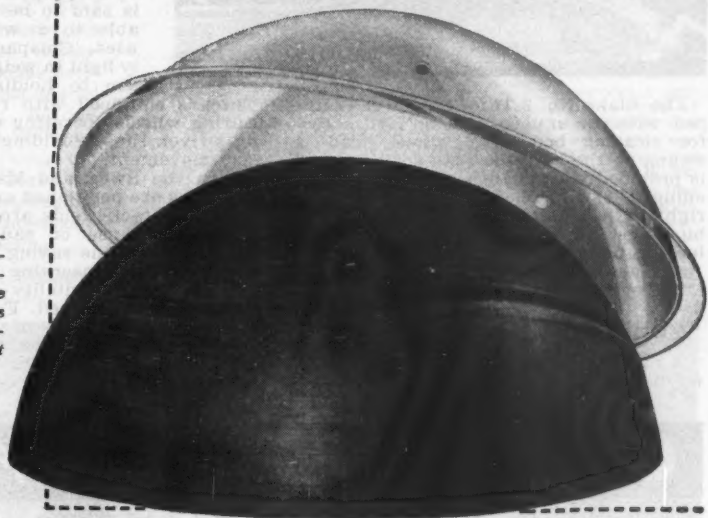
MASONITE* DIE STOCK



FORMS METALS AND



TRANSPARENT PLASTICS



This photograph taken at Bell Aircraft Corporation, shows laminated Masonite Die Stock used as a mold for forming transparent plastics.

Widely popular for mating dies, forming blocks, templates, jigs and fixtures, Masonite Die Stock also is now being used for molding transparent plastics—to speed production of gun turrets and nose coverings in war planes.

Masonite Die Stock can be easily laminated to any thickness for any type or size of mold . . . saves time and money in turning and tooling . . . will not split, check or crack.

Only one-sixth the weight of steel, this versatile die stock produces large molds which can be handled and lifted with comparative ease. And the smooth surfaces of these molds will not scratch or mar the plastic being formed.

Masonite Die Stock is available in thicknesses of $\frac{1}{4}$ to 4 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further particulars, please mail coupon below.

*TRADE-MARK REG. U. S. PAT. OFF. "MASONITE" IDENTIFIES ALL PRODUCTS MARKETING BY MASONITE CORPORATION. COPYRIGHT 1943, MASONITE CORP.



MASONITE CORPORATION

Dept. MS-9, 111 W. Washington St., Chicago, Ill.

Please send me illustrative literature and complete information about Masonite Die Stock.

Name and firm _____

Address _____

City _____

State _____

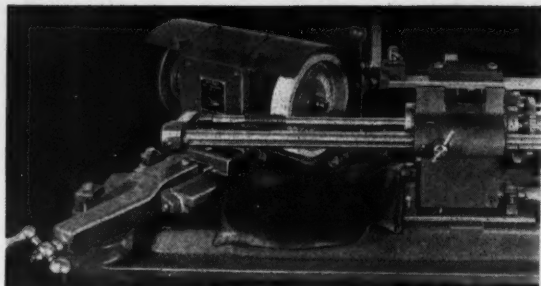


Fig. 2 — Illustration showing wheel head of Blake No. 2 Tap Grinder at extreme rear position

The Blake No. 2 Tap Grinder is equipped with an unusually long feed screw for clearing bed when wheel head is swung to the extreme rear position, and is provided with change gears for sharpening 2, 3, 4, 5, 6, 8, and 10-flute taps, right or left hand. Taps can be held in bushings for rapid operation, or in collets or between centers, as desired.

Sweetland Magnetic Clamp

A magnetic clamp for positioning welded members, to be known as the Sweet-

land, is announced by the Glenn-Roberts Co., 1009 Fruitvale Ave., Oakland, Cal. While designed primarily for shipyard use, the unit is said to be readily adaptable to a wide variety of uses. Compact and relatively light in weight in comparison to holding power, the clamp is equipped with retractable ball bearing wheels operating on a ball bearing swivel, thus providing for quick and easy movement.

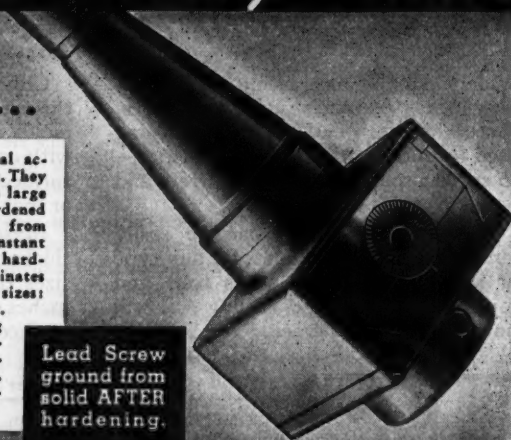
With the Sweetland Magnetic Clamp, stiffeners are positioned and held in position while tack welds are made directly without the use of saddles, clips, or other means, thus saving time, eliminating chipping, conserving materials, and avoiding the possibility of setting up stresses, it is claimed. For fairing deck plates, one magnet of the device is placed across the seam to bring plates to the same level. With warped plates, a single magnet used in conjunction with

CRITERION Boring Heads

CONSTANT ACCURACY...

Criterion Heads maintain original accuracy far beyond usual expectation. They are smooth, compact, rigid. Feature large graduated dial. Lead screw is hardened tool steel, with threads ground from solid after hardening, assuring constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request literature.

Lead Screw ground from solid AFTER hardening.



CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

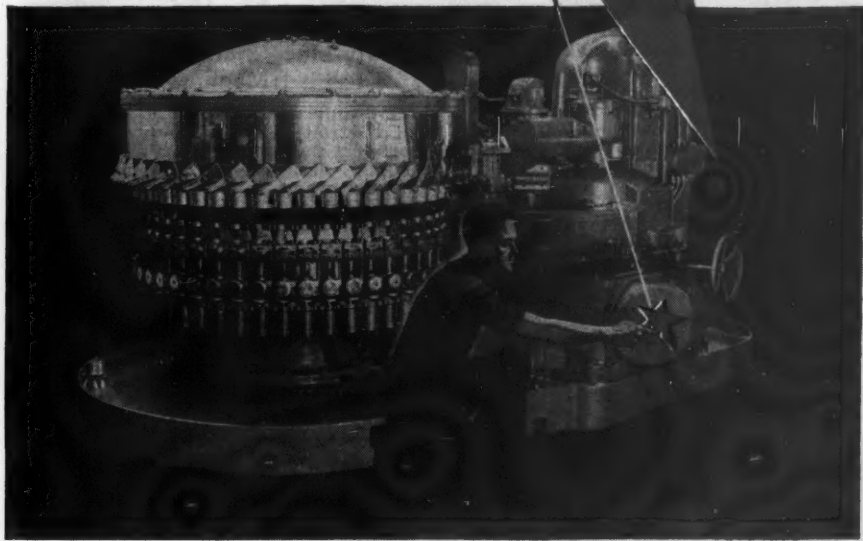
IN THE TIGHT SPOTS IT'S A STAR

To meet special market conditions, American Can engaged STAR to accommodate a 25-cycle motor to a 60-cycle space in their high speed can-closing machine. This meant fitting the horsepower required to a space of smaller diameter. STAR—as usual—engineered this ticklish "tight spot" successfully through its unique welding process, without special molds or castings. Just another example of STAR performance combining the flexibility of specialized application and engineering with the obvious advantage of standardized design.

Star Electric Motor Company
Bloomfield, N. J.



For 33 years, Star Motors have provided a complete line of standard as well as special motors—in sizes from $\frac{1}{2}$ to 200 H.P. Today they are providing dependable power for many applications. Write us about your requirements.



POWER PACKAGED AS YOU NEED IT



STAR MOTORS



Sweetland Model B Magnetic Clamp

tion horizontal magnet and 1-section vertical magnet to hold stiffeners rigidly in place and in true 90-deg. positions. The Model HVC is furnished with a Johnson bar.

A G-R 12-ampere rectifier is available for use with the Sweetland Magnetic Clamp to rectify alternating current and supply power. The device may also be operated from the power supply of a motor-generator welding set or from any 80-volt direct current.

a Johnson bar is said to effect leveling quickly.

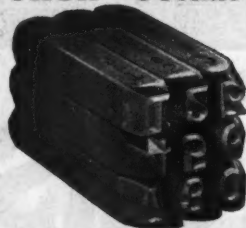
The Sweetland Magnetic Clamp is available in three models. Models B and C each comprise two-magnet units coupled together by a yoke which is equipped with a handwheel and pressure screw and is provided with vertical and horizontal adjustments. The Model B is composed of two 2-section magnets, is designed to exert a pull of $3\frac{1}{2}$ tons on $\frac{1}{2}$ -inch plate, and weighs 210 lb. The Model C utilizes two 3-section magnets, exerts a pull of $4\frac{1}{2}$ to 5 tons on $\frac{1}{2}$ -inch plate, and weighs 300 lb. The Model B is designed for use with stiffeners 8 inches high or less and the Model C, with girders up to 18 inches. A third model, "HVC", is composed of a 3-sec-

"Hy-Mac" Flame Hardening Machine

Hydraulic Machinery, Inc., 12825 Ford Rd., Detroit, Mich., announces the addition of a flame hardening machine particularly designed for hardening sprockets and other small parts to its line of "Hy-Mac" equipment. Available in both a bench and floor model designated as the No. 501 and No. 502 respectively, the machine is operated by a standard "Hy-Mac" hydraulic power unit and is electrically controlled.

On one side of the table is an indexing mechanism which holds the work and also has a lifting and lowering movement. On the other side is a movable platform on which are mounted two

THOR STAMPS MAKE A GOOD IMPRESSION



You get clean, uniform marks when you use THOR STAMPS. More marks per dollar!

They're made of correctly-heated alloy steel. Thumb side marking makes them easily read — easily used. Write for catalog.

THE PITTSBURGH STAMP CO.

812 CANAL ST.

PITTSBURGH, PA.



This "BIG STICK Policy" ups production 140%

Teddy Roosevelt had a good idea in 1901 when he advised, "carry a big stick, and you'll go far."

Yes, by today's arc welding standards that "Big Stick Policy" is still good.

**Right! USE THE BIGGEST POSSIBLE STICK
OF ELECTRODE, AND YOU'LL GO FAR.**

Look what they're doing in this shop. By boosting electrode size, output of tank track sections was increased like this:

Size "Fleetweld" Electrode	Parts Welded Per Hr.
1/8"	10
5/32"	17
3/16"	24

Swell! 3/16" electrode may not be a giant but it got "big stick" results here . . . an output increase of 140%. Some shops are boosting electrode size up to 3/8". It all depends on the nature of your work. You can get "big stick" advice from Lincoln.

THE LINCOLN ELECTRIC COMPANY
Cleveland, Ohio



"Hy-Mac" Flame Hardening Machine

special water-cooled torch tips and two quenching nozzles. With the part in place, the entire heat-quench operation is automatic.

Initial machine movement, with sprocket in place on indexing table, brings the table into position so that torches and quenching heads surround adjacent teeth. At the same time, pilots

all of the teeth have been hardened. At this point, the machine comes to a stop to allow for unloading of finished workpiece and loading of new part.

ALLIGATOR
TRADE MARK
FILES

Over 4,000 shapes, cuts and sizes of both Swiss and American patterns.

Get all your files from one source.
Write for new catalog.

Carson - Newton Co.
61-71 MILL ST.
BELLEVILLE, NEW JERSEY



Vard Multiple Lathe Stop

Designed to facilitate and at the same time speed up the performance of multiple cutting operations, a multiple type lathe stop which can be indexed so as to provide for six different positions of lathe carriage is announced by Vard Inc., 2981 E. Colorado Ave., Pasadena, Cal. The attachment consists of a 1½-inch thick cold rolled steel body block which is provided with a V-slot to fit front V-way of lathe. The body block is bored to accommodate a 2¼-inch diameter, case hardened and precision ground cylinder which contains six adjustable stop screws. Since there is but a 0.002-

GEARED FOR VICTORY

**BEVEL — HELICAL
SPUR — WORM**



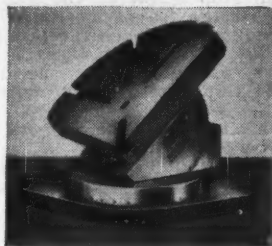
THE TAYLOR MACHINE CO.
1917 EAST 61st ST.
CLEVELAND, 3 OHIO

"TAYLOR - MADE"

quicker
SET-UPS
positive
PRECISION
ON COMPOUND ANGLES



THE
WESSON
UNIVERSAL
VISE



THE WESSON ANGLE PLATE

You can adapt standard machine tools *immediately* to difficult compound angle work . . . *slash set-up* and *tool-up time* . . . speed up precision angle milling, drilling, grinding...with Wesson Universal Vises. Accurately graduated in all planes to insure precision. Strong construction and rugged cradle maintain greater rigidity, for faster metal removal. Compact . . . *lower in height than any other Universal Vise* . . . works in closest quarters.

TWO SIZES . . . PRICED FOR EVERY SHOP!
When fitted with Slotted Surface Plate, the Wesson Angle Vise functions as a Universal Angle Plate.



AVAILABLE NOW

Immediate Deliveries

SEND FOR FREE BULLETIN ▶

WESSON CO.

DETROIT, MICHIGAN
(Ferndale Station)

WESSON CO., Detroit (Ferndale Station), Mich.

Please send me illustrated bulletin of
WESSON Universal VISES and ANGLE PLATES.

Name and Title

Firm Name

Address

City

State

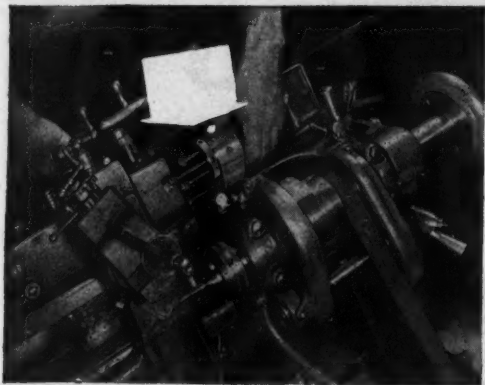


Illustration Showing Vard Multiple Lathe Stop Installed on Lathe

inch clearance between the body block and rotating cylinder, pressure fittings are provided to keep cylinder well lubricated. The body block is clamped to the lathe way by means of a cold rolled steel plate having two large knurled head screws and a 2½-inch Allen head screw which is said to add leverage to the grip afforded by the two larger screws, thus providing for unusually rigid

locking of clamping plate. According to the manufacturer, use of the Vard Multiple Lathe Stop with any four-way turret tool post makes a lathe a production machine, the attachment providing an accurate, positive setup for performing multiple cutting operations. The rotating cylinder is arranged for indexing to six positions and is engraved with sequential numerals at each stop position. The six, long, adjustable stop screws located in the cylinder act against a boss screwed onto the traverse carriage of the lathe, thus, by setting each stop screw to the desired length of carriage travel, positions for performing six cutting operations on one piece of work can be established. In this manner, unskilled lathe operators can quickly duplicate original cutting operations.

The Vard Multiple Lathe Stop is designed to fit most small V-way lathes up to the size of a 10-inch South Bend.

To Speed Victory! WE ARE READY TO SERVE YOU!

"**American**"

Cold Pipe, Conduit and Tube Bending Machines

Twelve types to select from. Hand operated capacities ¼" to 6" inclusive. Motor operated ¾" to 8" inclusive.

A few of our More Than 12,000 Customers:

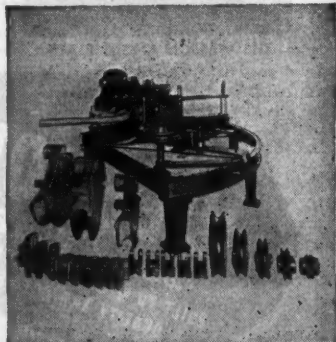
Kaiser Shipbldg. Co.; Bethlehem-Hingham Shipyards; Portsmouth Navy Yard; Moore Drydock Co.; Stone & Webster Engineering Corp.; E. I. Du Pont de Nemours & Co.; West Penn Power Co.; Illinois Central Railroad; Federal Pipe & Supply Co.; Alabama Drydock Co.; Westinghouse Elec. & Mfg. Co.; Todd-Bath Shipbldg. Corp.; So. Portland Shipbldg. Co.

Quick Deliveries

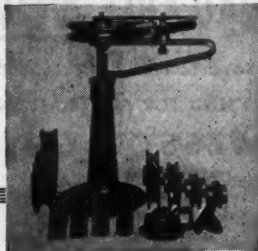
"**American**"

PIPE BENDING MACHINE
Company INC.

25 PEARL ST. BOSTON, MASS.



Write Air Mail for printed matter



A BARNES BLADE *Better* IS

Barnes hack saw blades and band saws are made in a modern plant devoted exclusively to blade production. Finest materials and expert craftsmanship make Barnes blades the first choice for every metal cutting job. Order from your mill supplies distributor.



W. D. BARNES CO. INC.
DETROIT MICHIGAN



**IT'S
FAST!**

**IT'S
HANDY!**

KIPP *Our* GRINDER

Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. If you are doing priority work . . .

**ONLY
\$29⁷⁵**

**MODEL
H**

Order Today!

**PROMPT DELIVERIES
ON THE
HIGHER PRIORITIES**

MADISON-KIPP CORP.

208 WAUBESA STREET
MADISON, 4, WIS., U. S. A.

Through the use of available attachments, the stop can be installed on practically any larger V-way lathe.

Ferracute Model No. F02 Foot-Operated Press

Forming, cutting, piercing, riveting, stamping and other light operations are

said to be efficiently handled through the use of the Model No. F02 foot-operated press introduced by the Ferracute Machine Co., Bridgeton, N. J. Available for bench mounting or with cast pedestal, the press is equipped with a pendulum lever which, when kicked, operates the ram down toward the work. As the lever returns to its initial position, the ram is raised to top of stroke.

Specifications of the Ferracute Model No. F02 Foot-Operated Press are as follows: maximum pressure exerted by ram, 2 tons; stroke of ram, 0 to 1½ inches; throat, center of ram back to frame, 4¼ inches; maximum distance available between bed and ram, 5¼ inches; bed, 8½ inches diameter; hole through bed, 3 inches diameter; weight



Ferracute Model F02
Foot-Operated Press

**GOOD MACHINE TOOLS
INSURE PERFECT RESULTS
AND TOP PRODUCTION**

Specify "QUALITY" H. S. Woodruff
Keyway Cutters When You Have a
Tough Job To Lick

QUALITY TOOL WORKS

WAUKEGAN

ILLINOIS

Now
FAST DELIVERY
 OF ALL TYPES OF
ROUND BROACHES

FROM

Colonial's
NEW PLANT

**ALSO FAST DELIVERY ON
 PLAIN FLAT BROACHES**



In Colonial's new plant are to be found greatly increased facilities for the production of broaching machines and broaches, particularly for round and plain flat types. As a result we are currently in a position to supply all round broaches and plain flat types in a matter of weeks instead of months. And this in spite of the fact that Colonial's total volume of broaches is vastly greater than ever before and quality still higher.

1918-25TH ANNIVERSARY-1943

colonial **BROACH COMPANY**
Broaching Machines  *Broaches-Broaching Equipment*
DETROIT..... U. S. A.

September, 1943

MODERN MACHINE SHOP 243



**A Warning Light
Should Not Be
Ignored - -**

**DUST BREATHING
IS DANGEROUS!**

**LEIMAN BROS.
DUST COLLECTOR**

**Individual Motor-
Driven Units**

For

**SURFACE GRINDERS
DOUBLE END GRINDERS
SAWS, SANDERS, ETC.**

LEIMAN BROS. Inc.

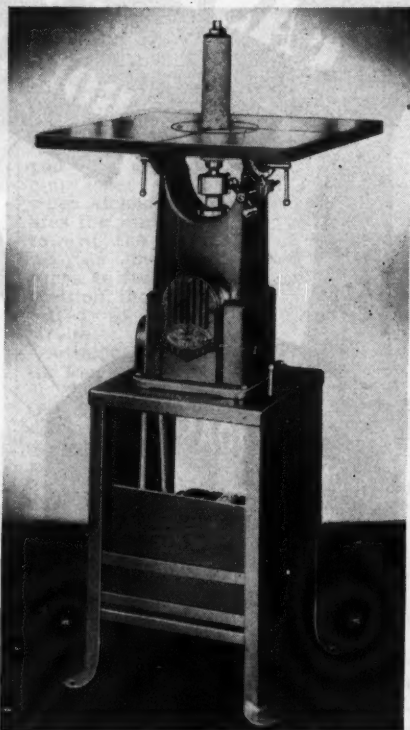
**168-1 Christie St.
Newark, N. J.**

(bench type), 200 lb.; weight (pedestal type), 300 pounds.

Ferracute Foot-Operated Presses are also available in 1 and 3-ton capacities.

**Boice-Crane Oscillating Spindle
Sander**

Available with $\frac{3}{4}$, $1\frac{1}{2}$, 2, and 3-inch diameter abrasive sleeves, the fast-operating oscillating spindle sanding machine



Boice-Crane Oscillating Spindle Sander

now being offered by the Boice-Crane Co., 937 Central Ave., Toledo, Ohio, is designed to sand any degree of bevel up to 6 inches in height and can be used for grinding aluminum, masonite, brass, die castings, and sheet iron for templets. Portable and sturdily constructed so as to eliminate vibration, the machine is

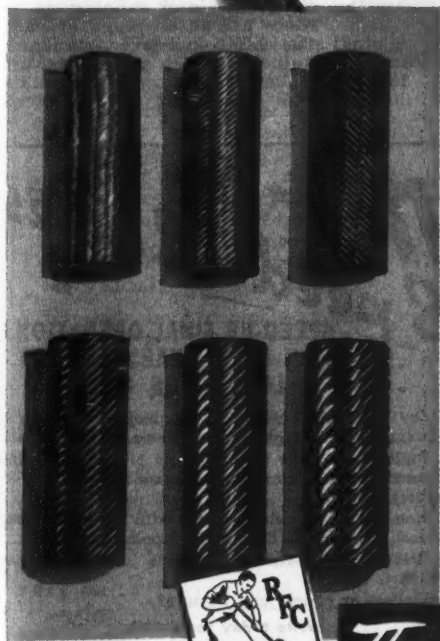
TEETH...

and a bite!



By the cut of its teeth it may seem gentle as a kitten's tongue—or tough enough to chew nails. But any user will tell you:

An RFC HAND-CUT ROTARY FILE . . . correctly chosen for its intended task . . . turns out the fast precision job that both helps cut production time to the minimum and insures highest quality of work.



It takes more than teeth. Each RFC file is right in balance . . . concentricity (shank straightness) . . . tooth form . . . degree of hardness . . . accurate shape and size. Made that way by the rotary file pioneers . . . specialists who during 20 years have perfected the design and manufacture of rotary files for every conceivable use on practically any metal (and other materials).

A wide assortment of standard RFC rotary file types, in high speed steel and high carbon steel. Pays to know them. Write for catalog.



The ROTARY
FILE COMPANY
STRATFORD, CONN.

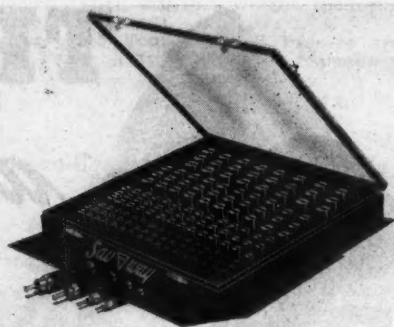
said to be readily adapted to the sanding of faces which blend gradually through different slopes at successive cross sections.

The sanding drum oscillates automatically through a $\frac{1}{4}$ -inch stroke and is designed to make 83 complete strokes at 2,500 revolutions per minute, sanding smoothly with the coarsest fast-cutting abrasives, it is claimed. The extra large, highly polished, 20 x 20-inch table of the machine can be tilted 45 deg. either way and is geared for close setting. Two scribed index lines designate exact positions for beveling, drafting patterns, and for core-box work.

Three-quarter and 2-inch nesting rings are included as regular equipment of the Boice-Crane Oscillating Spindle Sander. The crankcase of the unit is said to be of dustproof and leakproof construction. Bearings of the machine are grease packed and factory sealed.

Sav-Way Master Set of Plug Gages

Sav-Way Industries, 4875 E. Eight Mile, Detroit, Mich., announces a master set of standard plug gages for hole in-



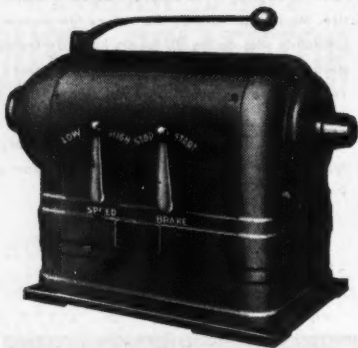
Sav-Way Master Set of Plug Gages

spection. The set includes 147 plugs and four handles located in a unique plastic case having a transparent plastic cover which affords a clear view of the contents of the case.

Plugs are set in increments of $\frac{1}{16}$ inch, starting at $\frac{1}{16}$ inch and ranging up to 1 inch. There are three plugs of each nominal size—0.0005 inch over, standard, and 0.0005 inch under. All plugs are deep-frozen before finish grinding to relieve internal strain and provide accel-

COLBORNE *Speed Lathes*

**SPEED-UP FINAL OPERATIONS
ON DIES, GEARS, SCREWS
LONG RODS, SHAFTS**



GOOD DELIVERY

For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc.

Built to meet the requirements of those desiring a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt.

Smooth automatic brake acts instantly when switch is thrown.

Collets or chuck may be used.

Write today for details

COLBORNE MFG. COMPANY

Machinery builders since 1879.

165 W. DIVISION ST., CHICAGO, ILL.

Here's your copy

OF THE

**NEW CATALOG on
BOICE-CRANE
15" DRILL PRESSES**

Every production engineer should have this interesting new booklet.

It describes in detail the entire line of 75 models in Boice-Crane 2600 series Helmet Heads and the 1600 series Drill Presses . . . the one make of precision drill presses that includes a model for most tooling needs. Standardizing on one make simplifies and reduces the cost of maintenance. The section on Boice-Crane Tapping Heads for Helmet Head Drill Presses tells how to do light tapping better, cleaner and more economically.

This new book contains engineering data and suggestions for incorporating Boice-Crane Drill Press heads, parts and work tables into special machines; and cost-reducing, labor saving fixtures for doing all kinds of jobs quicker and easier.

Handy, time-saving accessories that increase the work range of these sturdy, flexible machines are also described.

Write today for this catalog on versatile, portable, low-cost Boice-Crane Drill Presses now doing such a fine job in thousands of war plants.



**JUST
OFF
THE
PRESS!**

**FOR NEW
FREE DRILL
PRESS
CATALOG
USE THIS
COUPON**

BOICE-CRANE COMPANY • 937 Central Ave., Toledo 6, Ohio

Name

Street

City

BAND SAWS

•

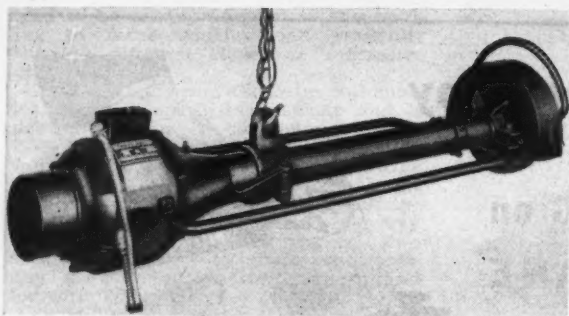
SPINDLE SHAPERS

•

SPINDLE SANDERS

•

DRILL PRESSES



Marschke "In-Between"
Grinder

erated aging, and are held to gagemakers' (X) tolerance.

Marschke "In-Between" Grinder

Said to fill the need for a grinding unit of a size falling between that of small flexible shaft machines and large swing frame grinders, a grinder to be known as the "In-Between" has been added to the line of Marschke grinding and buffing equipment offered by Vonne-

wheel guard enable operator to apply two-hand pressure to grinding wheel so as to obtain maximum cutting efficiency.

The well-balanced design of the Marschke In-Between Grinder together with its light weight (300 lb.) and swivel collar suspension arrangement permits unit to be angled to any desired position for grinding exposed surfaces on all sizes and shapes of castings. In addition to grinding castings, the machine is said to lend itself particularly well to the grinding of seam welds of tanks and structural work. When equipped with built-

A. I. S. I.



S. A. E.

N. E.

ALLOY STEELS FOR OFFENSE

Scientifically selected to conserve critical alloys and meet the requirements of the AIRCRAFT, ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft alloy steels at Buffalo and Detroit.

WHEELOCK, LOVEJOY & CO., INC.

138 Sidney Street, Cambridge, Mass.

Cleveland, Chicago, Newark, Detroit, Buffalo, Cincinnati

15
D-
g
ct
3
r.
to
6-
of
l
n-
le
ne
ly
so
y.
r-
ch
l-
it
or
es
to
d-
c-
t-

**A LIVE *muscle* OF STEEL
THAT LICKS TOUGH JOBS...**



Resilient strength, not rigid inflexibility, is the secret of Willard Spring Tool Holders. It's the reason why these Holders are so successful in preventing cutter breakage and damaged work... why they can be used for fine or coarse threading without danger of chatter or tool marks... why they can handle faster feeds with a heavier cut... why they are so adaptable to a wide variety of work... and especially why you should specify Willard Spring Tool Holders for economy, efficiency and accuracy!

Write for descriptive booklet

AUTO-ORDNANCE
Corporation

THOMPSON TOOL DIVISION

342 West Putnam Avenue, Greenwich, Conn.

WILLARD
Spring
TOOL HOLDER

For Threading and Forming

Right hand offset. Made in 3 sizes for 1/4", 5/16" and 3/8" square bits. Furnished with hardened wrench and one high speed cutter.



FORMING TOOL HOLDER

Straight and right hand offset. For cutter 5/8" x 2" diameter. Furnished with hardened wrench and one soft blank cutter.



Awarded to Auto-Ordnance Corporation for excellence in production of "Tommy" Guns

GREENWICH • STAMFORD • BRIDGEPORT • NEW YORK

September, 1943

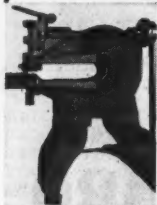
MODERN MACHINE SHOP 249

up polishing wheel or buff, the unit can also be adapted to various types of metal-finishing operations.

Gemco Portable Boring and Facing Machine

Produced by General Engineering & Mfg. Co., 1523 S. Tenth St., St. Louis 4, Mo., the Gemco Portable Boring and Facing Machine illustrated herewith is designed for use in performing boring,

GRAY TURRET HEAD METAL CUTTER OR NIBBLER

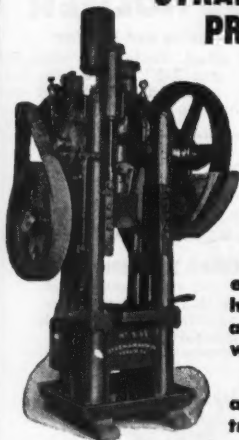


GRAY, Originator of First Practical Metal Cutter or Nibbler

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

GRAY MACHINE CO.
Box 596, Philadelphia, Pa.

STRAIGHT SIDE PRESSES

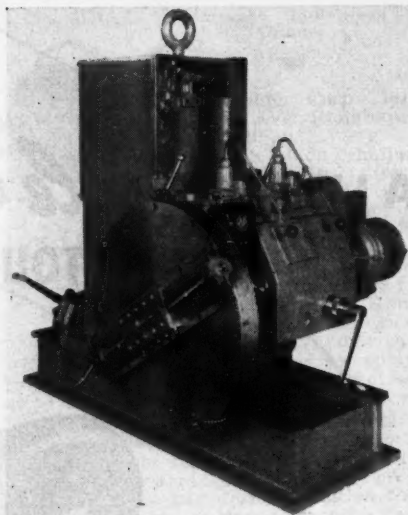


Outstanding in every detail for heavy blanking and forming work.

All stresses are taken centrally.

Write for new catalog illustrating and describing this and other presses.

ZEH & HAHNEMANN CO.
184 VANDERPOOL ST., NEWARK, N. J.



Gemco Portable Boring and Facing Machine

turning, and facing operations on large, heavy workpieces such as lathe beds, press frames, bed plates, pipe headers, valves, and so on. The machine is said to be unusually simple to operate and is arranged for easy moving directly to the workpiece to be machined. The unit is rigidly constructed of welded steel and embodies many unique features safeguarding the correct functioning of the operating mechanism. Instantaneous change-over from boring to facing operations is provided.

The machine proper is mounted on a heavy base on which it may be traveled 36 inches by spindle action. The unit features a 19-inch automatic or crank-operated horizontal travel of spindle



CENTERLESS GRINDING

ACCURACY — PROMPT SERVICE

Commercial Centerless Grinding Co.
6603 Cedar Avenue Cleveland, Ohio

"This is a Grinding War . . ."



Copyright 1892 and 1920 by Harper & Bros.

FIGHTING TOP-

A terror in its day was the Gatling gun, shown here in the fighting top of an 1892 battleship. It was good as guns went then, when there was no such thing as production grinding, but modern weapons leave it far behind.

How did our fighting equipment make such progress in so few years.

Give a pat on the back to those who dreamed up the new designs—and to the far-seeing men who spark-plugged research in years of peace as well as war. Much credit, however, for the development of our precision ordnance must go to American mass production methods. But without grinding methods and processes, mass production as we know it could not exist.

Take the modern anti-aircraft gun. Every moving part must be ground to split-hair precision. It is this precision which enables the gun to fire with such deadly accuracy, so rapidly and so continuously.

And this goes for every other piece of fighting equipment, too. Every moving part in the engines which carry a plane, tank, truck,

jeep, sub or ship into battle must be ground to closest tolerances.

Grinding is on the job even before production of these weapons begins.

The cutters, reamers, drills and broaches of machine tools that make machines of war must also be ground to close limits.

Carborundum has helped to develop many modern grinding processes in the past. And today, because "this is a grinding war," our engineers, research men—all of the men and women of Carborundum are working with redoubled energy.

Their contribution to the war effort received official recognition when the men and women of Carborundum were recently awarded the Army-Navy "E" Production Award. And they stand ready to make a similar contribution toward a better world of peace.

Every hour this war is shortened will save \$12,000,000. The lives it will save are priceless. So please remember that grinding wheels, too, are "Weapons for Production" . . . use them wisely to help end the war sooner. The Carborundum Company, Niagara Falls, N. Y.



THE CARBORUNDUM COMPANY

Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company

housing and 24-inch crank-operated vertical travel, and is equipped with seven spindle speeds ranging from 7 to 100 r.p.m. and four horizontal spindle housing feeds ranging from 0.009 to 0.063 inch.

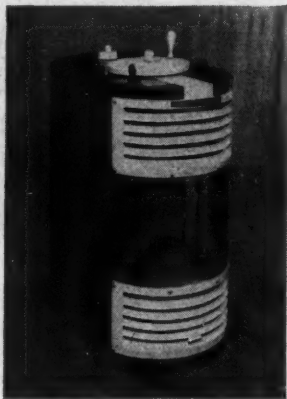
The faceplate of the Gemco Portable Boring and Facing Machine is 33 inches in diameter. All bearing surfaces and gears of the machine are lubricated by means of a pump-operated gravity oiling system. Various optional features are also available for the unit.

General Electric Outdoor A.C. Welder

The accompanying illustration shows a 500-ampere outdoor alternating current welder which has been announced by the General Electric Co., Schenectady, N. Y. The machine, which has a welding range of from 100 to 625 amperes at 40 volts, is especially designed for use in shipyards and other outdoor locations where exposure to the weather is encountered.

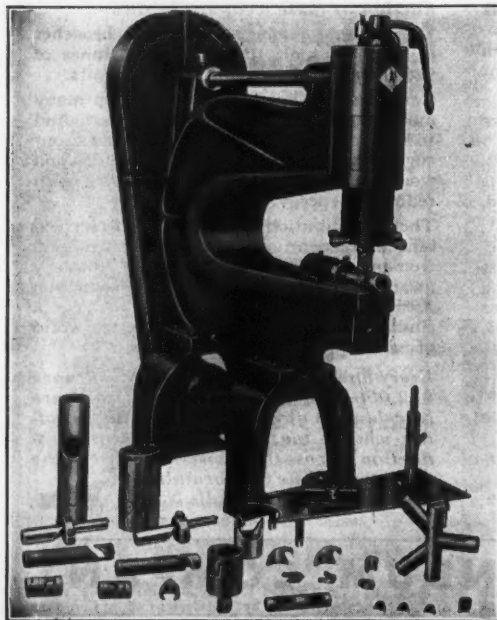
An outstanding feature of the welder is an "idlematic" control which automatically reduces the output voltage to

less than 35 volts whenever the arc is not in operation but provides full power for welding the instant the arc is struck.



General Electric Outdoor A.C. Welder

This control also includes a switch operated by a handle extending through the top of the case for starting or stopping



For **FAST** and **SAFE** cutting of sheet metal, duplicating parts, and to relieve other machine tools, investigate the

SAVAGE NIBBLING MACHINE

TUBE SLOTTING AND TUBE SHAPING
For cutting flat sheets by template or to a scribed line.

Cutting Capacities

Flat Sheets Mild Steel $\frac{3}{4}$ "

Tough Alloys $\frac{1}{2}$ "

Tubing

Wall thickness to $\frac{1}{8}$ "

1" I.D. to 36" O.D.

The Fastest Method of Tube Slotting and Shaping by Guide Template.

Ask for BULLETIN "H"

Manufactured by

W. J. SAVAGE COMPANY

Since 1885

KNOXVILLE TENNESSEE
Pioneer Manufacturers of Nibbling Machines

is
wer
uck.



per-
the
ing

IMMEDIATE DELIVERY

on all WEBBER Gage Blocks

"A" or "B" ACCURACY

Set No. 84 contains 84 blocks in sizes from .050" to 4.000". Range .100" to 12.000" in steps of .001", .200" to 12.000" in steps of .0001".

Price Set No. 84A—\$350.00
Set No. 84B—\$235.00

Set No. 43 contains 43 blocks in sizes from .100" to 4.000"—ideal for tool rooms and small shops. Range .200" to 10.000" in steps of .001", .300" to 10.000" in steps of .0001".

Price Set No. 43A—\$185.00
Set No. 43B—\$150.00

All "A" accuracy sets are accurate within .000004"—all "B" accuracy sets within .000008".

Set No. 38 (Thin Blocks) is supplementary to Set No. 84. Range .100" to 4.000" in steps of .001", .150" to 4.000" in steps of .00005".

Price Set No. 38A—\$195.00
Set No. 38B—\$155.00

Two distinct advantages . . .

Approximately twice the number of measurements are available in every Webber set—because each set contains a .10005" block permitting measurements to be made in steps of one-half of one-thousandth of an inch.

Life of Set Increased—two .100" wear blocks are included with each set. The price of the sets remains the same.

In selecting gage blocks buy from a recognized, established concern—Webber is the largest exclusive manufacturer of precision gage blocks in the United States. Another point to consider is Webber's complete service. We have complete facilities for inspecting—reconditioning—and replacing worn or damaged blocks. Use them.

Webber

GAGE COMPANY

12903 TRISKETT RD., CLEVELAND 11, OHIO



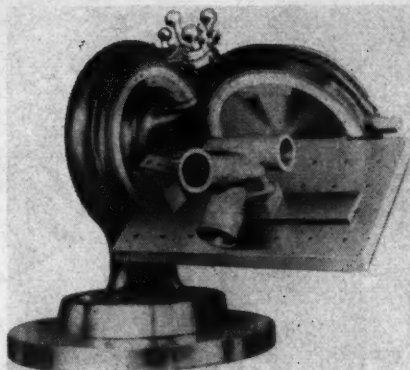
the welder manually.

According to the manufacturer, the General Electric Outdoor A.C. Welder is protected against the entrance of rain, snow, and sleet by drip-proof construction of all openings in the top of the case and by a sealed window over the current indicator. Wide louvers serve not only to shed water but to keep air velocity low. All internal parts have a special finish for protection against corrosion from moist air.

In addition, the welder is provided with all desirable features incorporated in General Electric indoor a.c. welders of the same type, including built-in power-factor improvement which is said to provide for low current input by maintaining the power factor at 95 per cent or better at all loads between 40 and 70 per cent of rating; finger-tip adjustment; stepless current control; fan-forced ventilation, and capacity for operation with long leads.

Studler Model B Angle Computer

Designated as the Studler Model B, an angle computer with 9 x 16-inch surface plate is announced by the Angle Computer Co., 5720 Melrose Ave., Los Ange-



Studler Model B Angle Computer

les 38, Cal. Designed to simplify the layout of die work, survey of castings, and inspection of precision-machined parts, the unit is said to handle castings or parts weighing in excess of 75 pounds.

The surface plate is provided with three individual directions of rotation—horizontal, vertical, and radial. The part



The **UNUSUAL LUERS** Patented Threading Tool enables you, **MR. MECHANIC**, to chase threads—**BETTER THREADS—from 25% to 50% FASTER.**

WHY?

Ask for a circular.

MANUFACTURED
BY
12 PINE ST.

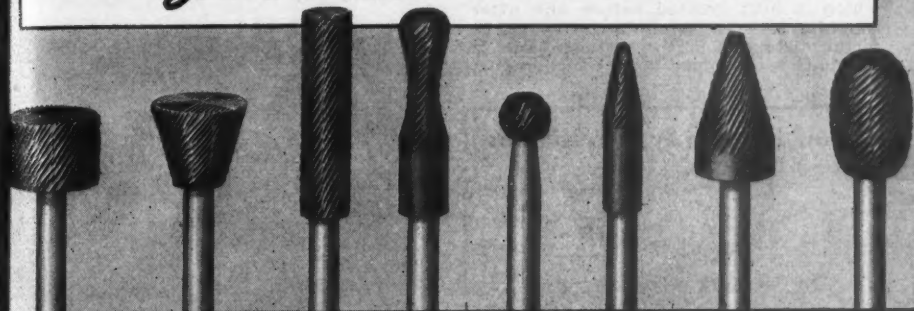
J. MILTON LUERS

MT. CLEMENS, MICH.

Produced under License issued by John Milton Luers Patents Inc.

FORD

A Right TOOL FOR EVERY FILING NEED



8 of many available shapes

IMMEDIATE DELIVERY On Hand Cut Files

Ford devotes its entire attention to the *one* job of making better rotary filing tools.

Special methods produce hard biting, fast cutting tools that stay sharp longer—and stand up longer.

Because neither hand cut

files nor ground cutters are all purpose filing tools, we make *both* types. Each has its specific applications. If in doubt, consult our engineering department.

Look into this *complete* line. Catalog showing many shapes and sizes sent on request. M. A. Ford Manufacturing Company, Inc., 744 West First Street, Davenport, Iowa.



THE MARK OF A GOOD FILE

FORD

GROUND CUTTERS

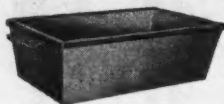


ROTARY FILES

or casting is clamped to the plate and every angle or compound angle is calculated or checked by means of dials equipped with verniers. All dials are graduated from 0 to 90 deg. in four sections of the circle. The dial recording horizontal rotation is equipped with two verniers, the other two dials have one each. All verniers read in five-minute spacings.

The frame of the Studler Model B Angle Computer is made of an iron alloy which is heat treated before and after roughing out to minimize warpage or metal distortion. The surface plate is provided with tapped holes for clamping.

New Nesting Type Tote Pans



20" long x 12" wide x 6 1/2" deep.
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.
Bridgeport, Conn.

EVEREDE BORING BAR HOLDERS



and
EVEREDE BORING BARS

Send
for
Circular

Representatives
in Principal
Cities

Adjustable to fit various size lathes. (Bushings are furnished with each boring bar.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits. • The No. 1 Holder for lathes from 7" swing to 9". • The No. 2 Holder for lathes from 8" swing to 12", and the No. 3 Holder on engine lathes from 12" swing to 24".

EVEREDE TOOL CO.
WILLIS STUTSON
180 N. Wacker Drive Chicago 6, Ill.

Bearing wear is compensated for by heavy spring pressure applied directly to the flanges.

Greenfield No. 1618 Rapid Inspection Limit Snap Gage

For quick inspection of precision parts with a minimum of gage wear, the Greenfield Tap & Die Corp., Greenfield,



Greenfield No. 1618 Rapid Inspection Limit Snap Gage

Mass., has introduced the Greenfield No. 1618 Rapid Inspection Limit Snap Gage shown in the accompanying illustration.

Feature of the gage is the extended lower anvil which facilitates inspection, since the work may be readily located and leveled before moving toward the "go" and "no go" anvils. This design is said to be useful both in measuring diameters of round parts and in gaging external lengths. The extended anvil design is also said to provide for easy gaging of work held on centers.

WE INVITE YOU TO TRY

CRATEX
WHEELS AND POINTS

The World's Best Rubberized abrasives for
Fine Grinding and Polishing

Attach this advertisement to your card or letterhead. We will send you a free trial sample. Or if you prefer send \$1.00 for Special 33 wheel assortment.

CRATEX MFG. CO. 81 Natoma Street
San Francisco • Calif.



ARCHER & SMITH

LIMITED

CARBIDE *Cutting Tools* HI-SPEED

125 NORTH EASTERN AVE.

LEXINGTON 34, KENTUCKY

TELEPHONE: LEXINGTON 5380

With modern facilities, years of
experience, and specialized skill

in the production of
STANDARD AND SPECIAL TOOLS,
made to your blueprints

Assuring all that is best in Carbide and
Hi-Speed Tools for the precision and
speed demanded today.

Write for Catalog — Send Blueprints

ARCHER & SMITH, Ltd.
125 NORTH EASTERN AVE.
LEXINGTON 34, KENTUCKY

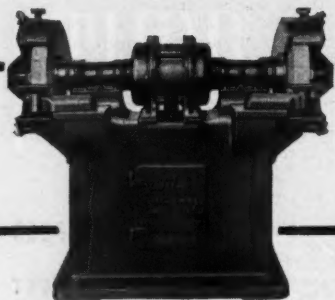
Please send latest cutting tool
catalog. ☐ Blueprints of special tools
we require are enclosed or ☐ mailed
under separate cover.

Name..... Title.....

Firm Name.....

Address.....

FOR FOUNDRY SNAGGING



BRIDGEPORT Floor Grinders

The rugged strength, durability and power of these grinders make them particularly well adapted for foundry snagging.

BRIDGEPORT Floor Grinders will withstand all kinds of service, hard work and abuse—day in and day out.

Put your hard, continuous offhand grinding jobs on a BRIDGEPORT.

Write for catalog.

Also Resinoid, Vitrified and Silicate Bonded Grinding Wheels, Face Grinders, Knife Grinders, Tool Grinders.

BRIDGEPORT
Safely Emery Wheel Co., Inc.
1297 W. BROAD ST. BRIDGEPORT, CONN.



Carboloy Improved Chip Breaker Grinder

A carbide tool chip breaker grinder with greater flexibility and capacity than a previously offered machine of the same type is announced by the Carboloy Co., Inc., 11143 E. 8 Mile Rd., Detroit 32, Mich. The improved unit is designed



Carboloy Improved Chip Breaker Grinder

primarily for grinding chip breakers in single point tools and roller turner tools but can also be adapted for use in grinding flat form tools and round or square boring bits.

The table length of the improved grinder has been materially increased while table construction has been made more sturdy. The long table with 10 3/4 inches of travel is said to make possible the grinding of breakers in both right and left-hand tools without moving universal fixture on table.

• The c
will hel
tion sch

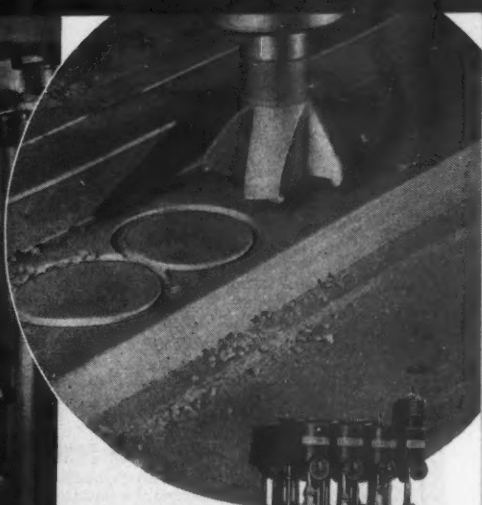
Footbur
wide ra
power a
tools to
with th
keep th

Write, v
delivery

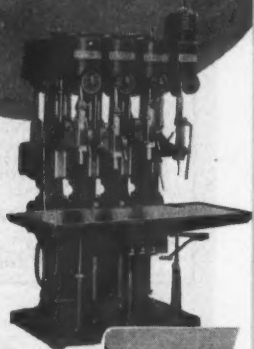
THE F

Detroit

MO
-WA



Correct
speeds
available
for standard
or special
tools



FULL RANGE SENSITIVE DRILLING MACHINE

• The choice of fine machine tools now will help you meet those new production schedules needed to win the war.

Footburt sensitives are built with the wide range of speeds and with the power and sturdiness to drive cutting tools to their full capacity. They are built with the care and precision that will keep them accurate over a long period.

Write, wire or phone for prices and delivery information.

THE FOOTE-BURT COMPANY
CLEVELAND, OHIO

Detroit Office: General Motors Building

**MOVE UP THE SCHEDULE
-WIN THE WAR QUICKER!**



No. 2 MACHINE WITH BACK GEAR—8" or 12" Overhang •
5/8" Drilling Capacity in Steel • Optional Speed
Ranges • 185 to 2300 R. P. M. • 280 to 3450
R. P. M. • Vertical Motor Drive with Standard
Single Speed Motor • Power Feed Assembly •
Tapping Attachment • Coolant Outfit

FOOTBURT
Sensitive
DRILLING MACHINES

The grinding head is designed for use with 6-inch wheels and is vertically adjustable from either side of the machine, which is available with 29-inch high pedestal having large storage space for tools, wheels, and so on. Standard motor is a single phase, 110-volt, 60 cycle unit with rating of $\frac{1}{4}$ h.p. at 3,450 revolutions per minute.

A universal fixture together with vise for holding tools up to $1\frac{1}{4}$ inches wide is included as standard equipment of the Carboloy Improved Chip Breaker Grinder. A vise for holding tools up to 2 inches wide can be obtained on special

T. H. LEWTHWAITE MACHINE CO.

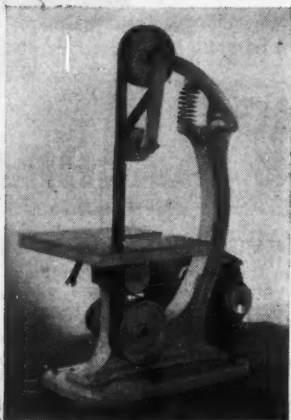


FRONT LEVER BENCH PUNCH

Capacity $\frac{1}{8}$ " holes through $\frac{1}{4}$ " steel. Can also be made for holes up to $\frac{1}{8}$ " in thinner metal. Stock punches and dies available from $1/16$ " to $\frac{1}{2}$ " by 64ths. All parts interchangeable. Weight 70 lbs.

Catalogue on Request

317 EAST 47TH ST. NEW YORK CITY 17
PLaza 8-0380



Industry's New Tool . . .

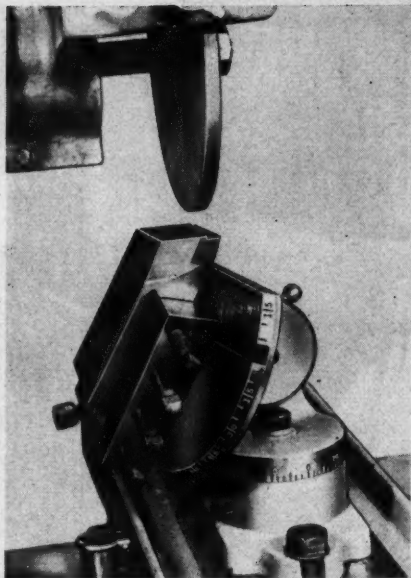
MEAD BURRING MACHINE

It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many kinds.

Prompt shipment

MEAD SPECIALTIES CO.

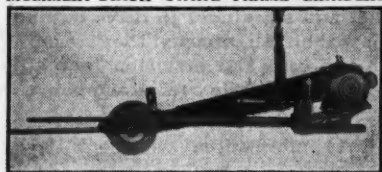
15 S. Market St Dept. 93-A Chicago, Ill.



Close-up view of universal fixture of Carboloy Improved Chip Breaker Grinder set for grinding chip breaker in roller turner tool

order. To facilitate the grinding of chip breakers in roller turner tools, the universal fixture is designed to tilt 90 deg. either side of horizontal, and the center of the fixture can be cross fed 1 inch past the center of the wheel. Also included as standard equipment are a wheel guard and wheel lubricant tank, necessary wrenches, and flexible light bracket complete with reflector. Shipping weight of standard machine without pedestal, 290 lb.; shipping weight with pedestal, approximately 390 pounds.

MUMMERT-DIXON SWING FRAME GRINDERS



Sizes 12", 14", 16", 18", 20" and 24" wheels.

Ask for Descriptive Circular

MUMMERT-DIXON CO.

120 Philadelphia St. Hanover, Pa.

UNION



ECONOMY

is the best policy

One of the first steps toward tool economy is to choose tools that are known for their ruggedness and longer lasting accuracy.

Choose **UNION** Tools — treat them well—and you will see the results of your economy in the longer accurate service and uninterrupted production you get from every tool bearing the **UNION** name.

UNION TWIST DRILL COMPANY

ATHOL

MASSACHUSETTS

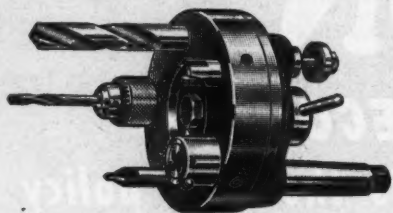
STORES

New York - - 61 Reade St.
Chicago - - 11 S. Clinton St.
Detroit - - 6540 Antoine St.

San Francisco - 121 Second St.
Los Angeles - 524 E. Fourth St.
Seattle - 568 First Ave., South

Koehler Tailstock Turret

The illustration herewith shows the Koehler Tailstock Turret, a compact, accurately constructed attachment for



Koehler Tailstock Turret

lathes, which is now being marketed by the Master Machine Co., 19 Grove St., Stamford, Conn. The turret is accurately centered in the lathe by means of a pin having a No. 2 Morse taper (unless otherwise specified) and is locked in position by a nut. Five $\frac{1}{8}$ -inch holes in the indexing head accommodate standard floating tap and die holders or box tools for performing drilling, tapping, or threading operations.

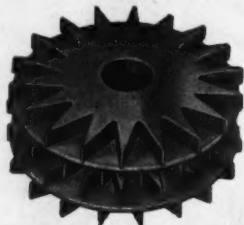
The Koehler Tailstock Turret is especially designed for clearance so that its use does not interfere with the proper action of attachments mounted on cross slide of lathe carriage.

"Steel-Temp" Hardening Solution

Said to eliminate the need for drawing of temper or color when quenching tools, a hardening solution for use with various grades of tool steel, to be known as "Steel-Temp," has been placed on the market by the Steeltem Chemical Co., 51 E. 42nd St., New York, N. Y. According to the manufacturer, the solution is ideally adapted to the quenching of chisels, punches, taps, reamers, boring tools, beading tools, broaches, mining tools, bits, caulking tools, dies, drills, shear blades, mandrels, cams, bushings, hammers, pins, gages, rivet sets, sledges, tongs, wedges, gears, wrenches, and numerous other tools and parts, providing them with cutting edges and surfaces that are unusually resistant to wear and impact.

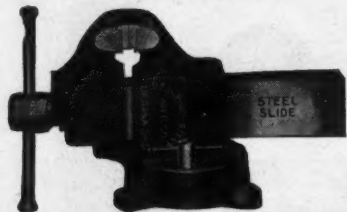
Steel-Temp Hardening Solution is supplied in 5, 10, 30 (half drum), and 55-gallon (drum) containers, ready for use.

DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We can supply you with the proper Dresser and Cutter for all of your grinding wheels.
Ask for copy of our catalog and name of your nearest dealer.

SIMPLEX Steel Slide VISES



A full line of Machinists', Filers, Welders, Production and Drill Press and Milling Machine Vises.
Let us send you our vise catalog and name of your nearest dealer.



THE DESMOND-STEPHAN MFG. CO.
URBANA • OHIO

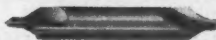
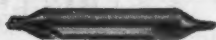
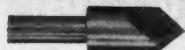


Side grinding
teeth within
limits of
.00025"



CIRCLE "R" Metal Cutting Saws

Made by Perfectionists



Also Combination Drills and Countersinks and Reamers

CIRCULAR TOOL CO., Inc., Providence, R. I.

CHICAGO · PHILADELPHIA · NEW YORK · DAYTON · CLEVELAND
SYRACUSE · INDIANAPOLIS · DETROIT · ST. LOUIS

Hercules Special Solenoid for Foot-Operated Spot Welders

Said to reduce operator fatigue to a minimum, a solenoid especially designed for the electrification of foot-operated spot welders is announced by the Hercules Electric & Mfg. Co., Inc., 2416 Atlantic Ave., Brooklyn, N. Y. Once the unit has been properly installed, the simple pressing of a button provides for the production of a constant, uniform pressure on the electrode arms of the welding machine, thereby enabling ideal

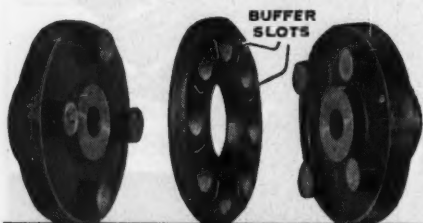
SHUR-GRIP DRILL VISES
PAY FOR THEMSELVES QUICKLY



Price
\$15.50

Equip your drilling department with SHUR-GRIPS and reduce non-productive time—hold all shops securely—fast and convenient—hardened jaws 5" wide open 5". Send for details.

JOHNSON TOOL CO., INC.
 Massasolet Ave., East Providence, R. I., U. S. A.



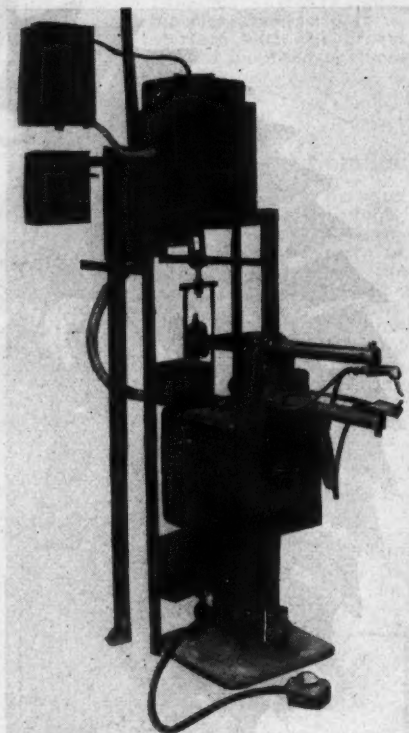
A MONEY SAVER

The **BUFFER-SLOT COUPLING** lengthens the life of your Motor-Driven Machines by absorbing the load shock and constant vibration that gradually wear out machinery and bring on shutdowns and repairs.

BUFFER-SLOT COUPLING

It not only gives you all the advantages of the ordinary Flexible Coupling but it goes a step further and restores that cushion driving torque lost when you discarded Belt Drives. It is long lived, dependable and especially adapted for use with machinery having Ball or Babbitt bearings. **SEND FOR BULLETIN No. 24-M.**

BROWN
 ENGINEERING CO. 120 N. THIRD ST.
 READING, PA.



20 KVA Taylor Spot Welder Equipped with Hercules Special Solenoid

spot welds to be consistently made, it is claimed. Pressure on the electrode arms is instantaneous and, as a result, arms open and close quickly, thus reducing actual welding time to a minimum.

According to the manufacturer, the

TURRET TOOL POST

Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.



F & M SALES COMPANY, HOLLYWOOD, CALIF.
MANUFACTURERS AND SELLING AGENTS

WHEN GRINDERS STOP

Waste Begins



REDRESS WITH

Abrasive

RED BAND DIAMOND TOOLS

Third Generation of Diamond Experience

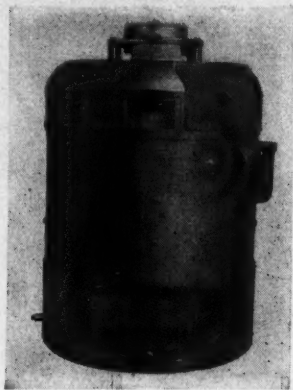
ABRASIVE DRESSING TOOL COMPANY - DETROIT

Hercules Special Solenoid is so constructed that it can be quickly and easily attached to all makes of spot welding machines, and can be obtained with or without automatic timer.

General Electric D.C. Vertical Motor

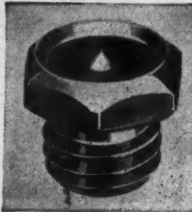
A line of direct current vertical motors with ratings of from 40 to 200 h.p. at 1,750 r.p.m. and with equivalent ratings at other speeds is announced by

the General Electric Company, Schenectady, N. Y. The motors, which are available in both constant and adjustable speed types, are designed for low-thrust, solid-shaft applications on pumps,



General Electric D.C. Vertical Motor

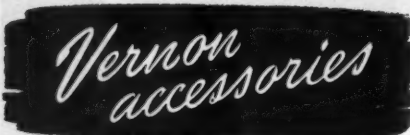
Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years. Write for Circular.

NIELSEN TOOL & DIE COMPANY

1960 W. Eleven Mile Rd.
Berkley, Mich.



VERNON 7" ROTARY TABLE

Precision ground top and bottom—Substantially ribbed. 4 table quadrants calibrated 0 to 90° each. Friction loaded worm dial graduated in 240 minutes. Overall height 2 3/4". Free folder!



VERNON 6" UNIVERSAL INDEX CENTERS

Head swivels and locks from 10° below horizontal to 10° past perpendicular. Spindle taper No. 9B&S. The 3 index plates provided will divide all numbers to 50 and all even numbers to 100 (except 96T) Write for bulletin.



machine tools, and marine underdeck auxiliaries.

According to the manufacturer, the G-E D.C. Vertical Motor is provided with complete protection from dripping liquids and falling objects. Convenient fittings on both the upper and lower bearings simplify lubrication, and provision for the escape of excessive grease reduces the possibility of over lubrication. A special bearing housing prevents grease from entering the motor and damaging the commutator and windings.

The cast iron conduit box is roomy and can be arranged for introducing leads at the top, bottom, or either side. Two hand-hole covers, which can be removed without the use of tools, allow



For Machine and Tool Work and Quick Set-Ups

Reich 3-way surface test indicator has proven quality, performance and endurance for all set-ups. .014 reading. Write for folder. Price \$5.00 Plus Postage.

Priority Rating Required.

J. R. REICH MFG. CO.
45 E. Stroop Rd. Dayton 9, Ohio

nec-
are
ust-
low-
mps,

deck

the
ided
ping
ient
ower
pro-
ease
rica-
ents
and
ngs.
omy
cing
side.
be
allow

ol
os
has
ace
for

D.
hio

1943

SIMPLIFY YOUR MACHINES WITH THIS "MECHANICAL MUSCLE"



...THE RIGHT CYLINDER FOR EFFICIENT POWER MOVEMENT

More and more today...engineers and shop men are finding new ways to simplify mechanical movements and improve efficiency... by using T-J Air and Hydraulic Cylinders! This assures getting the *utmost useful work done... with minimum loss of pressure due to friction.*

These Cylinders are skillfully designed to deliver maximum power movement in

every stroke... dependably... with long life. The mounting surfaces are parallel with (or at right angles to) the bore of the cylinder. All surfaces are strictly inspected for squareness and smoothness. All mounting holes are drilled—not just cored. T-J Cylinders are available in many sizes and styles... write for latest catalogs. The Tomkins-Johnson Co., Jackson, Michigan.

FOR TOUGH JOBS...SPECIFY



TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

Almond DRILL CHUCKS



**SINCE
1872**



The Almond Three Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks!

ALMOND THREE JAW DRILL CHUCKS

are furnished in 9 sizes with capacities from 3/16" to 1". These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole.

*Write for Complete
Details*

T. R. ALMOND MFG. CO.
ASHBURNHAM MASSACHUSETTS

for quick and easy inspection of commutator end brushes. The ring-type base of the motor has an accurately machined rabbet and jig-drilled mounting holes, thus assuring permanent alignment with the driven unit. Sturdy lifting lugs facilitate installation of the motor.

Special "Rubberflex" Bushing for Heavy Duty Work

The accompanying illustration shows a rubber-insulated "Rubberflex" Bushing of unusual load-carrying capacity which

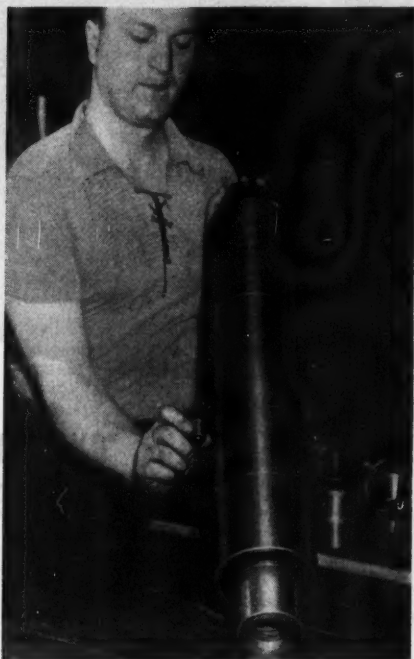
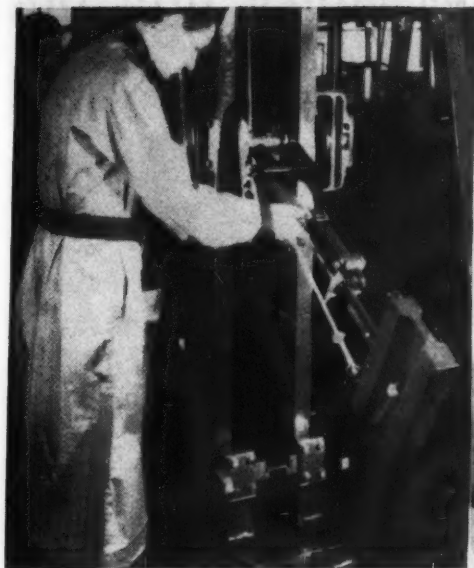


Illustration showing special "Rubberflex" Bushing for heavy duty work as compared with standard "Rubberflex" Bushing

has been completed by Bushings, Inc., Berkley, Mich. The bushing consists of a wall of rubber which separates, yet holds together, an oil-grooved shaft bearing 36 inches long and an outer steel shell 28 inches in length x 5 1/2 inches in diameter. Designed to insulate heavy equipment against shock, vibra-



Steel-fisted slugger makes sure Parker-Kalon Socket Screws can take bigger shock loads than they'll ever meet

There's no h'guess and b'gosh about the shock load resistance of Parker-Kalon Socket Screws. The Olsen Universal Impact Tester in Parker-Kalon's Quality-Control Laboratory can deliver a "haymaker" equal in force to a one-pound weight dropped 264 feet, creating tension, shear, and bending stresses far above normal. Only screws that have stamina to spare can survive this rigorous test.

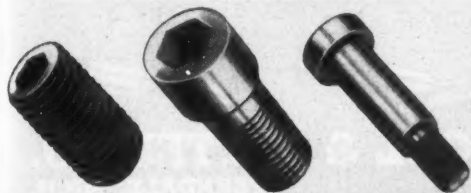
Measuring shock load resistance is only one of the 16 tests and inspections that are made to assure the dependable performance of P-K Cold-forged Socket Screws. This rigid routine of quality control eliminates the "doubtful screws" — screws that look all right, but some of which fail to work right. Socket Screw users need this protection today more than ever. Specify "Parker-Kalon" next time you order . . . it costs no more. Parker-Kalon Corp., 198 Varick St., New York 14, N. Y.

How to give a SOCKET SCREW the old "one-two"



This 16-point "Quality-Control" protects P-K Socket Screw Users

1—Chemical Analysis. 2—Tensile Strength. 3—Ductility. 4—Torsional Strength. 5—Ability to take Shock Loads under Tension. 6—Resistance to Shock Loads under Shear. 7—Hardness. In addition, there is a rigid inspection of these essentials: 8—Head Diameter. 9—Head Height. 10—Concentricity of Head to Body. 11—Socket Shape. 12—Socket Size. 13—Socket Depth. 14—Centricity of Socket. 15—Class 3 Fit Threads. 16—Clean Starting Threads.



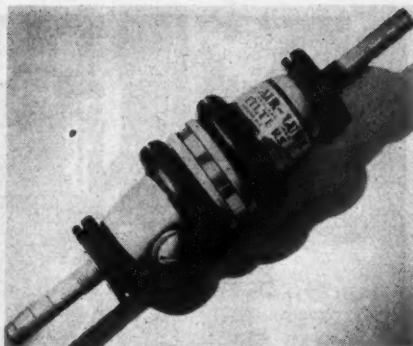
PARKER-KALON
Quality-Controlled
SOCKET SCREWS

tion, and wear, the bushing is said to be capable of sustaining a radial load of 10,000 lb. while under a torsional oscillating movement of 3 deg. at 1,800 cycles per minute.

In addition to the huge bushing, the illustration also shows a bushing of the type manufactured in large quantities by the company. This type of bushing serves a similar purpose of insulating equipment from shock and vibration but is less than 1 inch in diameter. Due to the Rubberflex method of manufacture, bushings with dissimilar members of practically any size can be assembled.

Air-Lube Lubricator

An automatic lubricator which, when installed in the hoses of air tools, is said to feed a regulated oil mist into such tools, thus eliminating the need for frequent daily oiling, preventing "freezing," and so on, is now being manufactured by Filters, Inc., 1515 Gardena Ave., Glendale, Cal. Known as the Air-Lube, this unusually lightweight lubricator is recommended for use in the air hose from 1 to 6 feet from the tool, or, may be used in air pipes for larger air-driven stationary or semi-portable tools. It is



Air-Lube Lubricator

also said to be adaptable for air passages in a machine.

The Air-Lube Lubricator features a positive feeding action which provides a regulated amount of oil to the air tool when in operation only. An automatic shut-off is said to prevent any flooding of air tool with oil. Unless otherwise specified, the lubricator is provided with two standard oil feed settings which cannot be altered by operators.

SHEAR-CUT HIGH SPEED END MILLS

Here's a complete line of
Single and Double End Mills.

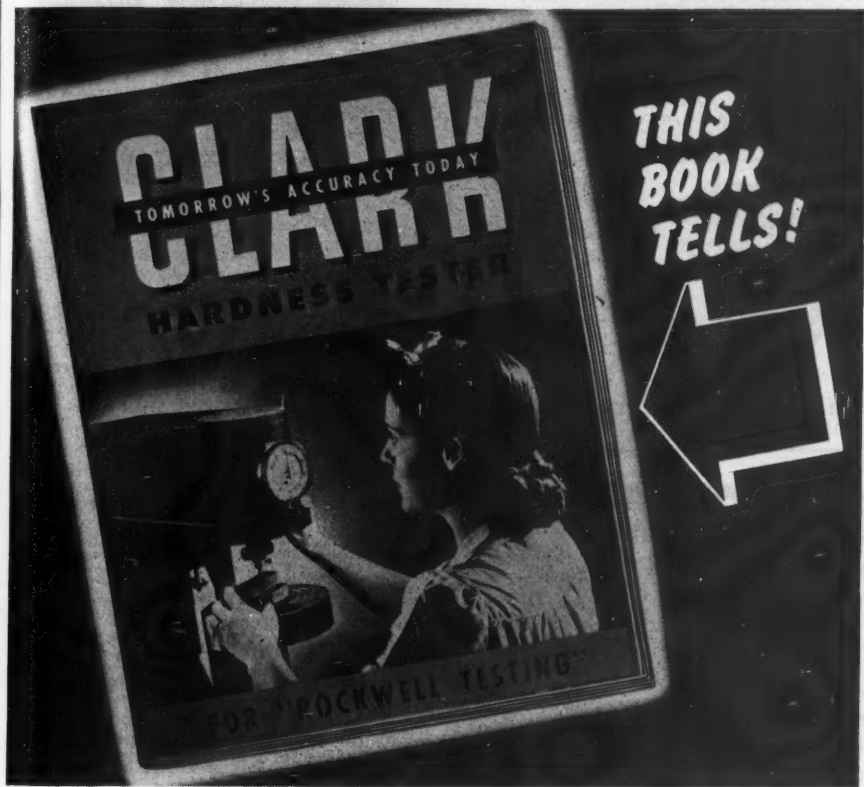
They save time and money.
SPECIFY PROGRESSIVE SHEAR-CUT END MILLS.

Write for catalog and prices.

PROGRESSIVE TOOL & CUTTER CO.
2345 WOLCOTT ST. FERNDALE, MICH.

DO YOU KNOW THE TRUTH

About Hardness Testing?



CLARK
TOMORROW'S ACCURACY TODAY
CLARK
HARDNESS TESTER

The new Clark catalog is more than a catalog.

It is a 20-page reference manual on the history, theory, practice, and equipment for modern, scientific hardness testing. Printed in two colors, size 8½" x 11", it is available without charge to manufacturing executives. Just drop a line on you letterhead to Department MS, CLARK INSTRUMENT INC., 10200 Ford Road, Dearborn, Mich.

The oil reservoir of the Air-Lube Lubricator is said to hold enough oil for more than a week under normal usage. A clear Lucite window indicates when reservoir needs refilling.

Plan-O-Mill "Multi-Miller"

A multiple thread milling cutter which is designed to provide a Higbee cut, to be known as the "Multi-Miller," has been placed on the market by the Plan-O-Mill Corp., 1511 E. 8 Mile Rd., Hazel Park, Mich. According to the manufac-

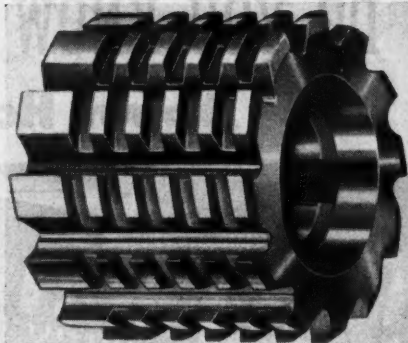


DRILL and PILOT BUSHINGS Frictionless —Rotary

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch.

Write for details.

GIERN & ANHOLTT TOOL CO.
1312 Mt. Elliott Ave. Detroit, Mich.



Plan-O-Mill "Multi-Miller"

turer, the construction of the cutter makes possible the milling of a perfect thread in a single operation since the Higbee cut provides for the removal of the "feather edge" at the same time that the thread is milled. As a result, savings in man and machine-hours are said to be effected and accurate, long-lasting parts produced.

The Plan-O-Mill Multi-Miller is available in National, Whitworth, Acme, V, and special forms, with straight or spiral flutes, and can be obtained ground or unground in a complete range of sizes for use on any type of thread milling machine.

CRITERION *Diamond* TOOLS



STEADY PRODUCTION

Dependable diamond tools are vital in present production schedules. Every day more users are turning to Criterion Diamond Tools for the kind of service which they must have. Quality of diamonds used plus a unique method of setting assures extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharp-pointed, selected thread grinding tools. Order direct. Request literature.

CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

"Cal-Cutter" Milling Cutters

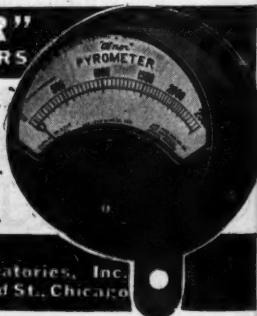
A line of carbide-tipped milling cutters, designated as the "Cal-Cutter," is now being produced by Machinery Mfg. Co., 1915 E. 51 St., Vernon, Los Angeles, Cal. Standard cutter styles available

"ALNOR" PYROMETERS

for every re-
quirement.

Inexpensive
accurate, dur-
able.

Write for catalog.



Illinois
Testing Laboratories, Inc.
153 W. Hubbard St. Chicago

REMOVE MORE METAL PER DAY WITH **TECO** *Cemented Carbide*



...cut at higher speeds

... hold cutting edges
longer

...produce more pieces
between grinds

...reduce grinding and
re-tooling time

You're "in the chips" more ways than one, when you use TECO Cemented Carbide. Because it stays on the job longer between grinds, TECO Carbide spends more productive time removing metal—less down time for re-tooling. Consequently, you produce more pieces per machine, per day.

This greater resistance to wear and breakage comes from the rigidly controlled density, hardness and uniformity of TECO Cemented Carbide. Available in grades, styles and sizes for practically every machining operation. Let us know your needs. Write for detailed catalog.

TUNGSTEN ELECTRIC CORPORATION • 562 39th Street, Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

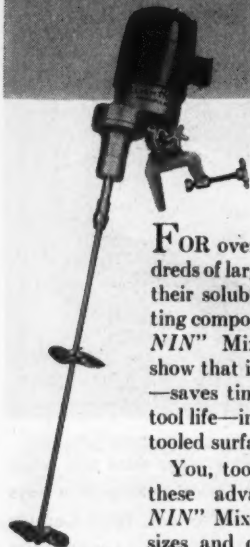
Representative: Architects & Builders Bldg., Indianapolis, Ind.

Pioneers in Tungsten Carbides
for over a Quarter Century



TECO CEMENTED CARBIDE

AGITATED COOLANTS INCREASE TOOL LIFE



FOR over twenty years hundreds of large plants have mixed their soluble coolants and cutting compounds with "**LIGHT-NIN**" Mixers. Their records show that it pays big dividends—saves time—vastly increases tool life—improves the finish of tooled surfaces.

You, too, can enjoy each of these advantages. "**LIGHT-NIN**" Mixers come in various sizes and capacities. Whether you "make up" for individual machines or have a central

circulating or cooling system, there's a "**LIGHT-NIN**" that will mix your cutting oils and save you money. And there are no installation costs. A "**LIGHTNIN**" can be readily clamped onto your present tank or vessel regardless of its size or shape.

Write today for the "**LIGHTNIN**" Mixer catalog. Tell us the size of your tank or tanks and the current available. We'll give you complete details.

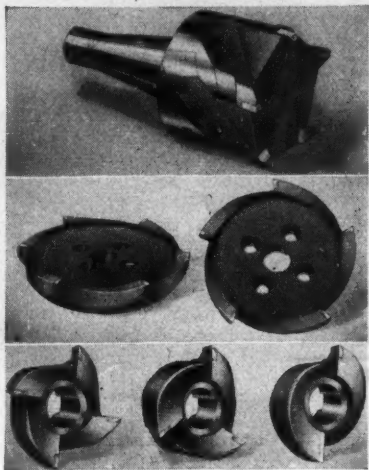


MIXING EQUIPMENT CO., INC.

1048 Carson Ave. Rochester 9, N. Y.

include end mills, staggered tooth mills, shell end mills standard and heavy duty face mills, hyper mills, half side mills, slitting saws, interlocking cutters, and so on.

Of novel design are Cal-Cutter bore face mills and adjustable face and step mills. In each of these types, the cutters are adjustable for radius. The bore face mill features cutters which are wedged clamped, and is available with two, three, or five cutting tips. The adjustable face and step mill is fur-



"Cal-Cutter" Milling Cutters

nished in two models having four or six cutting tips, each tip being controlled by a micrometer screw.

Cal-Cutters are made in designs for efficiently milling cast iron, cold rolled steel, heat-treated steel, aluminum, dural, and so on. Cutters of special design are available on order.

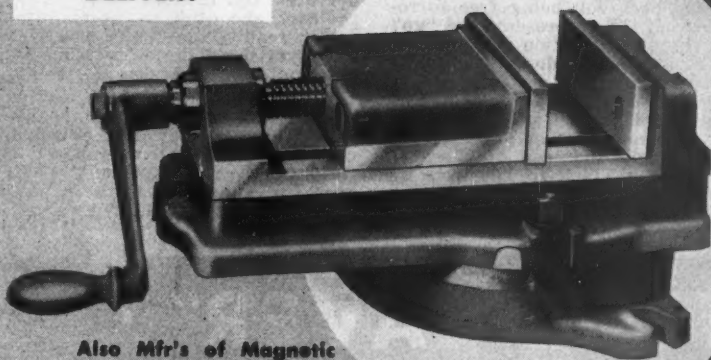
Sheffield Thread Roll Snap Gage

A combination "go" and "no go" limit gage for rapidly checking male threads to both maximum and minimum limits in one operation, the Sheffield Thread Roll Snap Gage shown in the accompanying illustration has been added to the line of gages produced by The Sheffield Corp., Dayton, Ohio. The gage consists of a frame similar to a plain snap gage in which are mounted two sets of

Swivel MILLING MACHINE

Vises

**IMMEDIATE
DELIVERY**



Also Mfr's of Magnetic
Chucks, Demagnetizers,
Lathe Chucks, Power Hack
Saws, Dividing Heads

**85 LB.
MASTER
HEAVY DUTY
6½" SIZE
\$32.55**

Suitable for milling machines,
drill presses, shapers, etc.,
these large semi-steel vises
may be used plain or swivel.
The steel jaws are sturdy.
Key slots provide for attach-
ment to machine table hold-
ing surface, with jaws at right
angle or parallel to table.
Junior 4¼" size, \$23.60
45 pounds.....

L-W CHUCK CO.

20 N. ST. CLAIR ST.

TOLEDO, OHIO



Sheffield Thread Roll Snap Gage

gaging rolls, each roll being free to rotate. One set of rolls represents the "go" limit and the other the "no go" limit.

Useful in aircraft, ordnance, automobile, and other industries for checking various critical threaded parts, the Sheffield Thread Roll Snap Gage is designed to indicate inaccuracies in pitch diameter, thread angle and lead, and so on, thereby enabling steps to be taken to correct the tool or machine at fault. The gaging rolls are said to rotate with a

minimum of friction as they contact the work and can be reground repeatedly, thus providing for long life of gage.

The Sheffield Thread Roll Snap is furnished standard for American National form, coarse and fine series. Gages for all other forms are available on order.

Progressive Repair Cart for Spot-Welding Aircraft

A self-contained cart especially designed for use in the repair spot-welding of steel parts of aircraft in the field has been developed by the Progressive Welder Co., 3050 E. Outer Drive, Detroit 12, Mich. Equipped with an electric timer and a wide selection of both air-operated and manual "tong" type guns, the cart, according to the manufacturer, can be readily adapted to practically any job involving the spot-welding of stainless and other light gauge steels.

The transformer, cables, and guns of the cart are cooled by means of a "Frostrode" refrigerating unit which circulates a low-temperature coolant through the transformer, cables, and guns, the condenser in the refrigerating unit being air cooled. The cables are of

"TIME SAVER"

Improved holder with interchangeable steel type makes part number changes a simple operation. Turn a screw to make the change.

... Guaranteed for years of service.

Used by hand or press, it's a time and money saver.



PROMPT DELIVERIES

SOSSNER



STOCK SIZES:

TYPE #1

TYPE #2

TYPE #3

161 GRAND STREET
NEW YORK CITY

33 years of precision work-
manship and reliable service
... Sossner's reputation is your
guarantee of satisfaction.



**SPECIAL
TAPS**

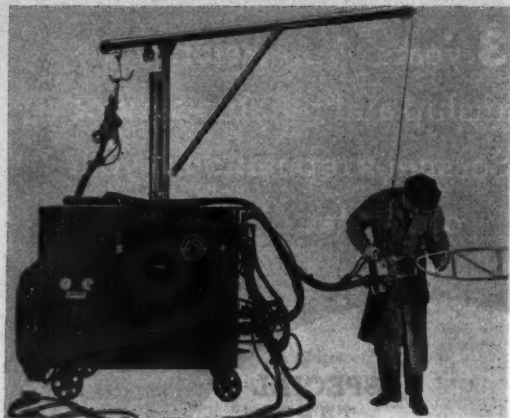
**STANDARD
TAPS**

High speed, precision ground from solid
stock in American National, full or modified
Whitworth, and British Association threads.

ALSO: STEEL STAMPS • GAGES • CUTTING TOOLS

SOSSNER

161 Grand Street, New York City 13, or 27 Broadway, Lynbrook, N. Y.



Progressive Repair Cart for Spot-Welding Aircraft

onto the landing field, if necessary.

Gibbons Safety Handle Wheel

Recommended for use on all types of metal-working machines, particularly those of the rapid-traverse type, the Gibbons Safety Handle Wheel illustrated herewith is now being marketed by the Gibbons Mfg. Co., 11 Gordon St., Worcester 4, Massachusetts.

The wheel is designed for keying to machine shaft and is arranged in such a manner that when the operator grasps the handle and pulls it toward him slightly, a pin in the handle engages one of a series of holes located around the rim of the wheel, thereby enabling the latter to be rotated. When the op-

a Progressive (P-H) concentric kickless type, and the guns are designed so that a large variety of different shaped electrodes may be mounted in them.

The only connection necessary to cart in order to use is a power lead. Since the cart is provided with long cables, the connection can be made in a hangar or elsewhere and the cart rolled directly

Quality

THE NICHOLS MILLER

Offers Speed with Tool Room Accuracy

Modern precision construction and remarkable adaptability make the Nichols a natural choice for dependable performance.

Insets illustrate FLEXIBILITY. Upper view shows Profile-milling cam slot using template and follower. Lower view is typical horizontal set-up, milling clutch teeth using simple indexing fixture. Moderate price. Ask for full details!

W. H. NICHOLS & SONS
Waltham, Mass.

THE NICHOLS MILLER
NICHOLS-MILLER CORPORATION

"JOE"

by *Given*



**...BET IT WON'T
SPEED UP OLD SPINDLES
LIKE A *GIVEN!***

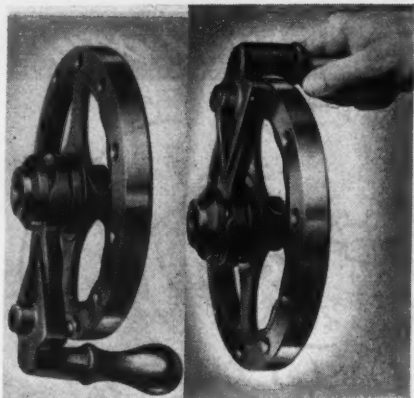
PERHAPS you could rig up a dingus like that to turn spindles faster on older machine tools...but Joe has the right answer for your problem—use a *GIVEN!*

A Given Vari-Speed Drive is a compact, simple, completely self-contained direct drive that increases top r.p.m. 30% or more while still retaining those useful slow speeds needed for large work diameters. Often doubles output by insuring efficient use of carbide cutters. It's easy to operate whether you use it on a lathe, mill, shaper or any other machine tool. Six turns of the convenient handwheel cover the range from fastest to slowest speeds with no gaps between—and without stopping to shift belts or gears.

Four bolts mount the Given on the machine, and various brackets are made for installation on tools of all sizes and types. 1 to 10 h.p. Givens are available. Send for our recommendations—and ask for Bulletin and blueprints mailed free.



***Given* VARI-SPEED DRIVE**
GIVEN MACHINERY CO., 3855 SANTA FE AVE., LOS ANGELES



Gibbons Safety Handle Wheel

erator releases the handle, a spring-operated plunger forces the handle away from the rim of the wheel so that the pin becomes disengaged, thus permitting the handle to drop to an idle position where it cannot strike or catch operator's clothes should the wheel still be in motion. According to the manu-

facturer, the handle is so constructed that it cannot be re-engaged with the wheel without first being properly manipulated by the operator.

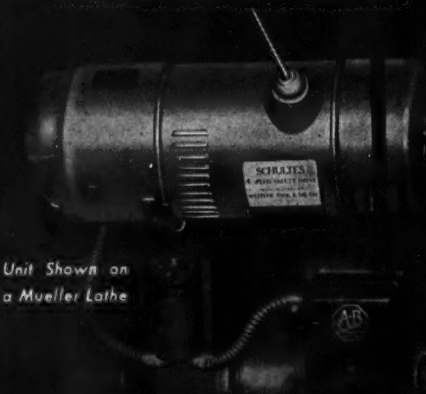
The Gibbons Safety Handle Wheel can be made to any specifications desired and is available with chrome or oil polish finish.

Lyon Improved Hydraulic Elevating Table

Improvements in the design of its Lyon Hydraulic Elevating Table for handling dies, locating work in convenient positions for welding, transferring heavy parts from one level to another, supporting overhanging work, and other operations where easy foot-actuated elevation is desired are announced by the Lyon-Raymond Corp., 1247 Madison St., Greene, New York.

The unit, in the standard model, is of a portable type with two stationary and two swivel casters and single-speed hydraulic foot pump. The table swivels but may be locked in one position, and is said to operate efficiently with all loads up to its maximum capacity of 2,000 lb. The table top is 30 inches square and

"SCHULTES" ... The King of Motor Drives!



Unit Shown on a Mueller Lathe

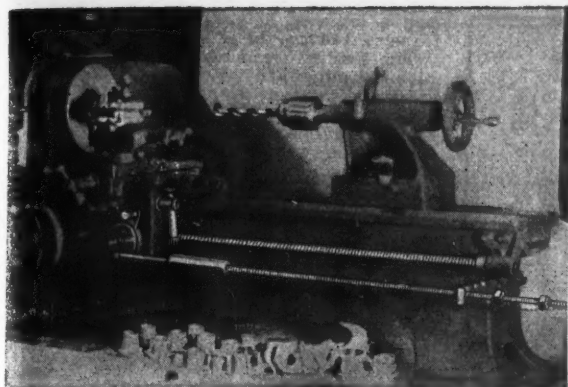
ALL HELICAL GEARED,
UNSURPASSED IN POWER,
EFFICIENCY, SAFETY
AND COMPACTNESS

Write for Complete Detailed Specifications

WESTLOF TOOL & DIE COMPANY

4192 BELLEVUE AVE.

DETROIT, MICHIGAN



**MAKES
LATHE WORK
SIMPLER
AND
FASTER!**

AMERICAN *Automatic* LATHE STOP GAUGE

PATENT PENDING

This new attachment accurately sets the length of travel of the lathe carriage for one or more cuts so that duplicate pieces can be made on a mass production scale. Once a stop is set, every piece of work will receive a cut of identical length with unfailing accuracy. The gauge stops the carriage only; it does not shut off the lathe motor or power feed.

- INCREASES PRODUCTION
- CUTS SET-UP TIME
- REDUCES REJECTS

- PREVENTS ACCIDENTS
- PERMITS USE OF SEMI-SKILLED LABOR
- EASILY ATTACHED

MODEL AL-2 — for 24" centers. Prices on other sizes furnished on request.

\$9.²⁵

Quickly installed on Logan, Atlas, South Bend, and other make lathes. When ordering, specify make and model of lathe, swing and distance between centers.

DEALERS' INQUIRIES INVITED

Can Be Used 3 Ways:

1. AUTOMATIC
2. SEMI-AUTOMATIC
3. MANUALLY

SCHULTZ & ANDERSON CO.

109 EDISON PLACE, NEWARK, N. J.

MANUFACTURED BY THE AMERICAN PRODUCTS CO.

ROGERS REAMERS

SINCE 1885



Fig. 37



Fig. 39

Conserve High Speed Steel by using
Rogers Inserted Blade adjustable-for-
wear Reamers.

Align and concentric in diameter down
to $\frac{1}{8}$ inch.

Deliveries Good.

JOHN M. ROGERS TOOL CORP.
GLOUCESTER CITY NEW JERSEY

has a lowered height of 29 inches and an elevated height of 43 inches.

The standard model table can be furnished with seven different optional features as follows: (1) floor lock to keep table from moving on its casters, (2) spring-balanced towing handle, (3) locking device which permits table top to be turned and locked each 15 deg. throughout an entire circle, (4) collapsible retaining bars for table sides to hold work on table, (5) four swivel casters in place of the standard two swivel and two stationary casters, (6) feet in place of casters, and (7) two-speed hy-



Lyon Improved Hydraulic Elevating Table

draulic foot pump in place of single-speed pump. Special tables can also be furnished with any of these features as well as others, and with different capacities, sizes of table top, and lowered and elevated heights.

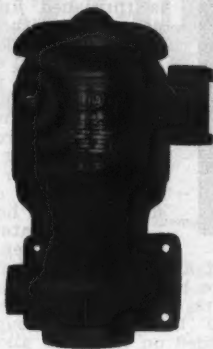
"Dustkop" Self-Contained Dust Collecting System

Designed to eliminate the need for sheet metal work as well as the necessity for connection into existing dust control equipment, a self-contained dust collecting system consisting of a "Dustkop" Dust Collector with flexible metal hose and dust concentrating hood is now being offered by the Agat-Detroit Mfg. Co., 2046 Book Bldg., Detroit 26, Mich.

Portable and compact so that it can



PUMPS and VALVES

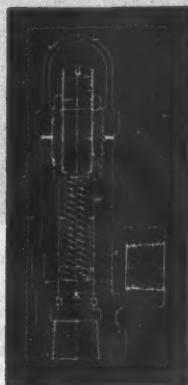


Symbol FVM
Vertical Type

2

FULFLO PRODUCTS

with but a single
thought:
**to cut costs and worry
in production and
maintenance.**



FULFLO CENTRIFUGAL COOLANT PUMPS

Illustrated is a close-coupled vertical type coolant pump mounted below water level on the side of coolant tank or machine. Special patented seal. Splash-proof, ball-bearing Master motor.

FULFLO BY-PASS, OIL-RELIEF VALVES

To assure specific pressures on oil hydraulic pumping units.

NON-CHATTERING

Pipe sizes $\frac{1}{4}$ " to 2". For pressures from 0 to 350 lbs. Brass, hardened or stainless steel pistons. Iron or brass bodies.

THE



Write today for mechanical data book.

Specialties Co., Inc.
BLANCHESTER, OHIO



"Dustkop" Self-Contained Dust Collecting System

ped onto the flange and tightened down to effect an air-tight connection without the use of tools. The hood is furnished knocked down but with Pittsburgh seams at the joints so that it can be assembled and placed in operation within a few minutes' time. A flange is also provided on the hood for making connection with the other end of the flexible metal hose.

be moved about as needed and "spotted" wherever dust-creating operations are performed, including grinding, sanding, buffing, and polishing operations, the Dustkop is supplied complete as shown, ready for operation and with a flange to fit the 6-foot length of 4-inch diameter flexible metal hose which can be slip-

Where greater distances between the source of dust and the Dustkop are desired or where hood is to be suspended over the work, additional lengths of flexible metal hose can be supplied. Handles provided on the hood allow for ready moving about so as to permit the hood to be placed in such a manner that heavy pieces thrown off from work dur-

Robertson's ECONOMY Power Hack Saws

The machine illustrated is the ROBERTSON ECONOMY No. 5-B. Capacity, 8" x 15". Blades, 12"-24". 6" stroke.

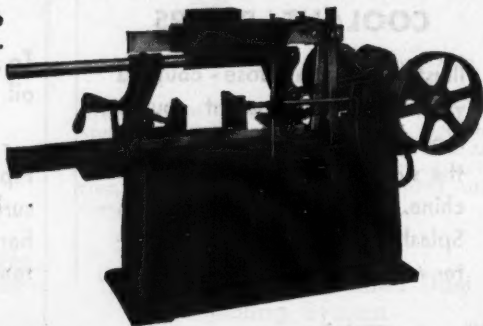
FEATURES

Rugged Simplicity
Hairline Accuracy
Long Blade Life

Long Life
High Speed
Large Bearings

Few Adjustments
Hydraulic Lift on Back Stroke

Write for information
and delivery dates.



There is a ROBERTSON ECONOMY SAW for every cutting job

**W. ROBERTSON
MACHINE & FOUNDRY CO., INC.**

32 RAND ST.

BUFFALO, N. Y.

A NAME WORTH LOOKING FOR when you need quality tools



THE NORMAL Millers Falls line includes hack saw frames in 18 models, each with its special features of serviceability, convenience, and economy. "Best of all breeds" for most tool users is No. 48 (illustrated), a higher-quality frame of unusual excellence in design, ruggedness, and value. Rigid; fine balance; polished and buffed finish; comfortable checked Lumarith unbreakable handle. Adjustable for 8 to 12 in. blades.



IDEAL companion for No. 48 is Tul-Flex, the most efficient and economical general-purpose hand saw blade ever developed. Won't break, won't strip. Bites cleanly through tough rods or thin tubing. A good example of what we mean by "Millers Falls Quality."

STANDARD items of excellent reputation in the normal Millers Falls line are 52 sizes and styles of cold chisels and punches, hammer-forged of high grade steel selected for its extreme toughness. Superior heat treating—a Millers Falls specialty—makes these items uniformly the finest quality. Look for the Millers Falls name when you buy, you'll decide the results are worth extra care in selection.



MILLERS FALLS TOOLS

**MILLER FALLS
COMPANY**

SINCE
1868

**Greenfield, Mass.
U. S. A.**

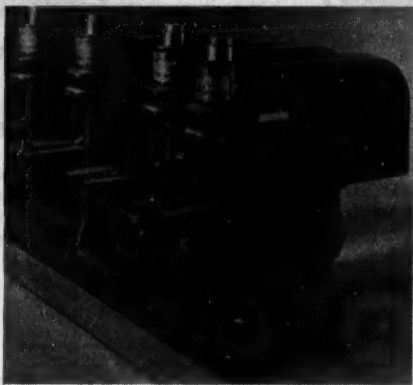
ing grinding operations are stopped.

Suction for the operation of the equipment is produced by means of a 1½ h. p., continuous duty, direct motor driven, multiple-blade fan which provides the Dustkop with a 6,500 feet per minute air velocity at a volume of 1,250 cubic feet per minute. The dust-laden air is drawn away from the work through the flexible metal hose and into the cyclone separator of the Dustkop. The cleaned air is then returned to the working area thru a drum-shaped spun glass filter which forms the upper portion of the Dustkop. Dust and dirt which have been sepa-

rated out of the air by the cyclone are deposited in a large glass jar which provides easy means for determining when emptying is required.

Wales Type "B" Hole Punching Units with Adjustable Adapters

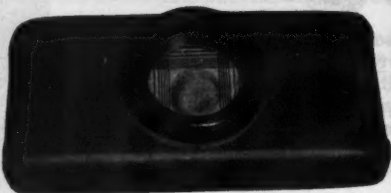
The illustration herewith shows a recent addition to the line of punching and notching equipment marketed by the



Wales Type "B" Hole Punching Units with Adjustable Adapters

Wales-Strippt Corp., 345 Payne Ave., North Tonawanda, N. Y.; namely, Wales Type "B" Hole Punching Units with adjustable adapters for punching holes in flat sheets. The adjustable adapters are used for mounting the punching units on press brake rails and allow for the punching of staggered as well as straight-line hole patterns. Maximum

"ALL-WAY" LEVEL



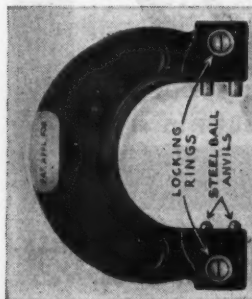
The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
5½" x 12" 3½" x 6"
Write for Bulletin

W. M. B. FELL CO.

702 SOUTH ST.

ROCKFORD, ILL.



ADJUSTABLE SNAP GAGES IN STOCK Model A

Immediate delivery .025" to 4¼"

PROMPT DELIVERY ON PLUG GAGES .125" to 8"

Extraordinary Improvement in Adjustable Snap Gages with Ball-tipped anvil and amazing positive locking system cannot get out of set—Pat. Appl'd for.

GOOD Prevent Spoilage Utilize Less Skilled Help
GAGES Speed-Up Operations Reduce Costs

EASTERN PRECISION GAGE CO.

HERSH TOWER BLDG., BROAD ST.

ELIZABETH, N. J.

Phone, Elizabeth 2-9519



"tripl

Tool "a
on the o
plant fa
Every 4
ing cau
Cutting
commen

Here an
tools ev
12 hour
parency

SUN



TOOL ABSENTEEISM REDUCED 66%

SUNICUT

"triples tool life . . . improves finish . . . increases production"

Tool "absentees" can hurt war production just as much as the operator who stays away from his job. One large plant faced with the problem solved it this way.

Every 4 hours time was lost in changing tools . . . regrinding caused production to lag. They called in a Sun Cutting Oil Engineer who studied the problem and recommended a change in cutting oil — to Sunicut 110.

Here are the results. Instead of time out for changing tools every 4 hours they now change them only every 12 hours — a 200% increase in tool life! Sunicut's transparency permits easy inspection of work while machin-

ing . . . and a smoother finish is obtained. Because of less "time out" for tool changes production increased 20% . . . and is being stepped up still more since machine speeds have now been increased one-third.

Performance like this is winning Sunicut an outstanding reputation on all operations where a straight, sulphurized cutting oil is used. For longer tool life, better finish, increased production in your plant, call on a Sun Doctor of Industry to analyze your needs and recommend the proper grade of Sunicut today. Write

SUN OIL COMPANY • Philadelphia
Sun Oil Company, Ltd., Toronto and Montreal, Canada



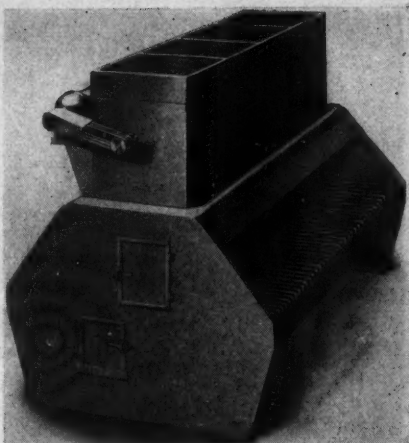
SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

front-to-back adjustment of the adapters is 3 inches.

In addition to being arranged for mounting on press brake rails, the Wales Type "B" Hole Punching Units are also designed for interchangeable use on T-slotted plates and templates of punch presses. Setups on T-slotted plates and templates are quickly made by simply bolting the punching units directly to the T-slotted plates and templates in exact positions determined by master pattern.

Of completely self-contained design, each Wales Type "B" Hole Punching Unit consists of a punch, die, holder, stripper assembly, and guide, the punch and die being arranged so as to remain in accurate alignment. The units are available in throat depths up to 18 inches and, if desired, can be obtained with backstop gage rods, $1\frac{1}{2}$ inches center-to-center hole minimum.



Schneible Multi-Wash Ventilated Workbench

A multi-wash ventilated workbench which is designed to effectively remove dust resulting from operations such as the grinding, filing, chipping, buffing,

Schneible Multi-Wash Ventilated Workbench

cleaning, and polishing of iron, steel, aluminum, magnesium, molded plastic, and vitreous parts has been developed by the Claude B. Schneible Co., 3953 Lawrence Ave., Chicago, Ill. The bench is



Diamond Tools



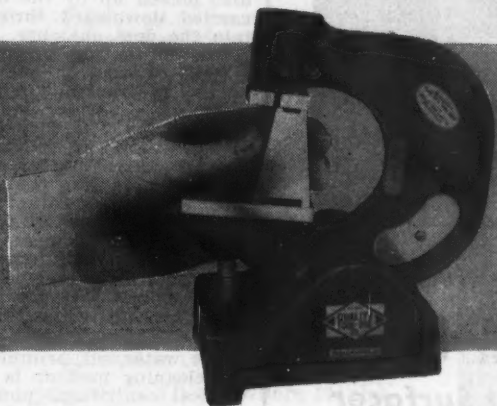
● Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.
If you don't know diamonds, know your diamond dealer. Our 45 years in this field merits your confidence.

ACME DIAMOND TOOL COMPANY

15 MAIDEN LANE NEW YORK, N. Y.

SPEED UP GAGING IN *Your* PLANT WITH

Quality
"KWIK-CHEK"
ADJUSTABLE LIMIT SNAP GAGES



HEAVY-DUTY
TYPE
Fast...
Accurate...
Rugged

★ The gaging of odd or irregular-shaped pieces need not be a production "bottleneck." Quality "Kwik-Chek" Adjustable Limit Snap Gages are designed for speed and accuracy. Note the lower anvil extending beyond back edge of top gaging button. This helps in gaging counter-bored work. All Quality "Kwik-Cheks" are equipped with AGD Locking Device. Available in sizes: .0" to 6¼" in Heavy-Duty Type and .0" to .760" in Midget Type.

WRITE FOR ILLUSTRATED PRICE LIST

Quality **TOOL & DIE CO.**

Vermont & Noble Sts., Indianapolis, Indiana

MANUFACTURERS OF "QUALITY PRODUCTS"

Compare This NEW SPEED
with the old way . . .



True-Surfacing Freehand with
PORTER-CABLE
Wet Belt Surfer

• The two faces of the aluminum casting shown must be finished true flat, at exact right angles and glass smooth. With a Porter-Cable Wet Belt Surfer, these rigorous requirements are met with only one application of each face to the belt, and without mounting the piece in a fixture. Entire area finished at one time!

Learn about this amazingly adaptable precision tool that is replacing or supplementing many operations on millers, planers, surface grinders, shapers—relieving them for other work—speeding the entire production flow. Send for our new booklet, WET-DRY BELT SURFACING.



PORTER-CABLE
MACHINE CO.

300-9 Wolf St.,
Syracuse, N. Y.

available in single and double-side models, and in any one of four arrangements. A double-type unit, which accommodates workers on either side, is shown in the accompanying illustration. The two working surfaces of this bench are 10 feet long x 30 inches wide. Either hardwood or steel grating can be furnished.

The space under the grates is closed by a dust hopper which slopes to a longitudinal center tank. Air is drawn from the room and over the work by means of motor-driven fans located in the top of the air-washing section and out of the dirty air stream. Dust particles from the operation are impelled against a set wall in the back of the bench or the wet panel below the grate and washed downward into the tank below. Dust is also picked up by the indrawn air and carried downward through the grates into the dust chamber, where it is impinged on the wet surfaces.

Final removal of the dust is accomplished by washing the air in Schneible multi-wash collector units located within the bench. The cleansed air is discharged back into the workroom through a safety filter. Solids are continuously flushed from the collectors and discharged into a settling tank, which also receives the solids that fall on the flushed surfaces of the hopper. Convenient removal periodically of the solids from the settling tank is provided by doors at either end of the unit. The liquid curtains also serve for the quenching of sparks.

The water, oil, or other liquid used as the cleaning medium is circulated by a vertical centrifugal pump and may be used over and over again in the collector system. For magnesium operations, oil, preferably having a flash point of 490 deg., a fire point of 500 deg., and Saybolt viscosity of 6 sec. at 100 deg. F., may be used. Spent cutting oil, it is stated, has proved quite satisfactory to

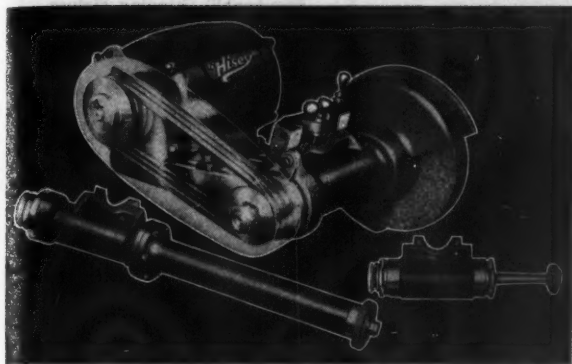
DIX **PRECISION MADE**
AND
AVIATION TYPE
UNIVERSAL JOINTS

AIRCRAFT
AND MARINE
SPECIALTIES
TURN BUCKLES

UNIVERSAL
JOINTS, ETC.

15 STANDARD SIZES
Precision made (and we do mean "precision") from $\frac{3}{8}$ " to 4" Hub Diam. to Army, Navy, Air Corps. spec. AN-40236 ready to install. $\frac{3}{4}$ " to 1" sizes in stock. Write, wire for detail, data, etc.

DIX **MANUFACTURING COMPANY**
603 EAST 35th ST. LOS ANGELES, CALIF.



HISEY 3 H. P. Grinder set up for external grinding. The Internal grinding heads are interchangeable with the external head on machine.

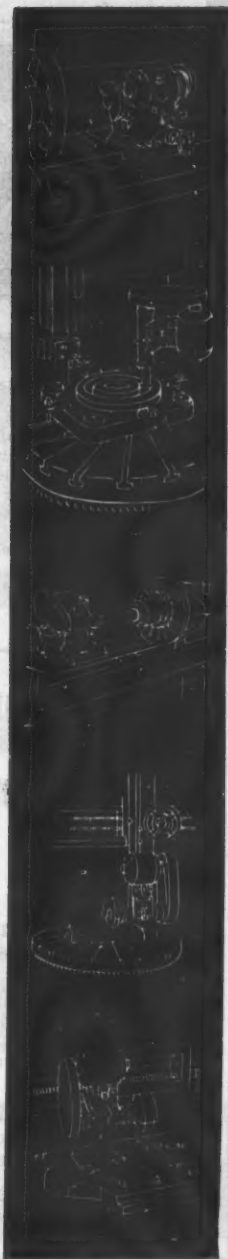
You CAN Grind It!!

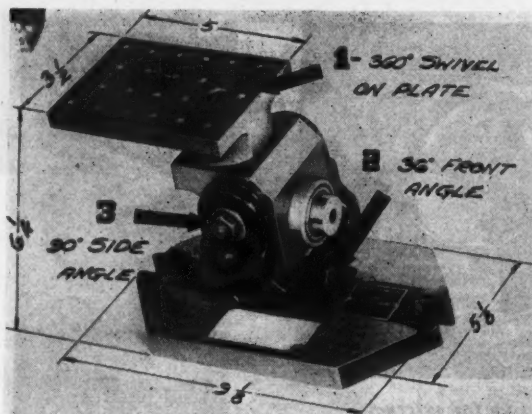
The War Program has presented many manufacturers with grinding problems. No matter how well equipped a grinding department may be, a job will turn up which cannot be handled with the regular equipment. This is where HISEY Wide Range Precision Grinders step into the picture. Mounted on lathes, boring mills, planers, etc., they will do any internal, external or surface grinding operation. They are built for tool room accuracy with ruggedness and power for continuous production work. Size range from $\frac{1}{4}$ to 10 H. P. capacity in a number of different models.

WRITE FOR CATALOG No. 60LM

Hisey

THE HISEY-WOLF MACHINE CO.
CINCINNATI, OHIO





Leahill Grinding Fixture

Leahill Grinding Fixture

The Leahill Grinding Fixture illustrated herewith, product of James J. Dillon & Sons, 404 Warren St., Dayton, Ohio, is primarily designed for use in sharpening various types of milling cutters but can also be readily adapted for use in grinding small parts or light milling operations where compound angles are required. Any desired angle of the work to be machined can be ob-

tained since the fixture is arranged for swiveling in three directions.

Sturdily constructed so as to prevent vibration while in use, the Leahill Grinding Fixture is available with both $\frac{3}{8}$ and 1-inch diameter locating buttons for grinding various sizes of milling cutters. Where the hole of a cutter is larger than 1 inch, the cutter can be equipped with

eliminate the hazards of magnesium dust handling. Water is said to be adequate for most other dust collecting operations, however, any liquid of suitable characteristics can be used for special requirements.

This complete dust removal system requires a minimum of attention and is designed so as not to interfere with bench operation.

THE PERFECTION WIRE STRIPPER WILL SPEED UP YOUR PRODUCTION IMMEDIATELY!

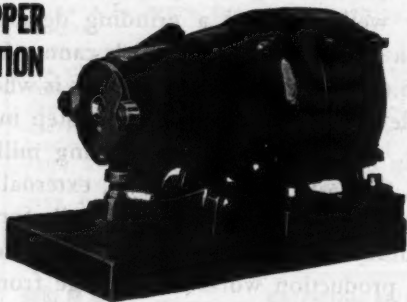
- RAPID
- PRECISE
- EFFICIENT
- ECONOMICAL
- BUILT TO ENDURE
- SIMPLE TO OPERATE

THE PERFECTION WIRE STRIPPER puts wire stripping on a production basis—Instantly and completely it removes the insulation from the ends of solid, stranded or multi-conductor cable or wire, up to one half inch in diameter.

THE PERFECTION WIRE STRIPPER is a precision equipment—ruggedly built and engineered to provide years of trouble-free operation. Send now for descriptive literature on this versatile and essential instrument.

WEBER MACHINE CORPORATION

59 RUTTER STREET
ROCHESTER, N. Y.



PATENTED MODEL A

"UTILITY"
motor-in-head
GRINDER

2 can work as
economically
as one



**Wheel
Guards
are
Adjustable
to
Wheel
Wear**

For 'round-the-
clock production
on work which
calls for best re-
sults quickly and
economically.

Totally enclosed motors; dust-
proof anti-friction bearings;
push button starter with over-
load protection; enclosed ad-
justable wheel guards; tool
tray and lift-out water pot;
wheels removed quickly.

Reasonable deliveries.



Model 500
1 to 5 h.p.

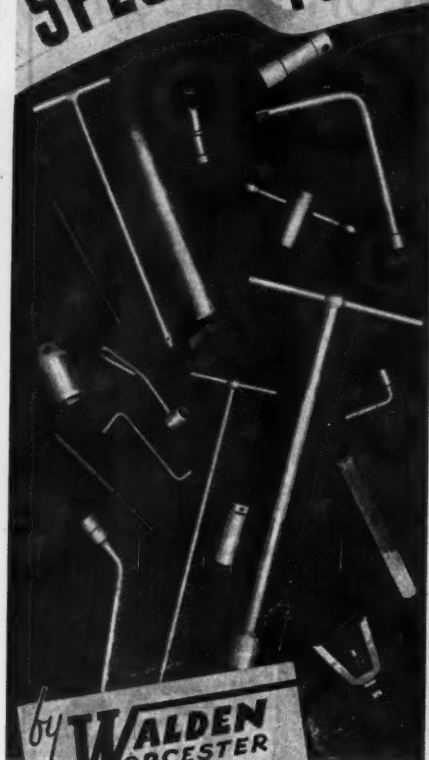
THE UNITED STATES

ELECTRICAL TOOL CO.

CINCINNATI,

OHIO, U.S.A.

SPECIAL TOOLS



To Speed Production Facilitate Maintenance or Repair

Here are a few representative answers to individual problems . . . solved by Walden Worcester. Where our standard sockets, wrenches and tools did not meet the particular requirement these were specially designed to do the job, quickly and efficiently. Our experienced engineering staff stands ready to serve you . . . to help you lick that special tool problem . . . backed by a plant with over 36 years experience in "Knowing how". Send us a print . . . or tell us your problem . . . Let us get to work on it. No obligation, of course.

STEVENS WALDEN, INC.

473 SHREWSBURY STREET

WORCESTER, MASS.

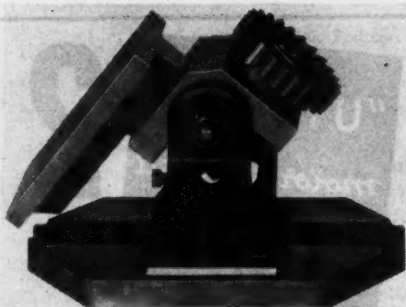
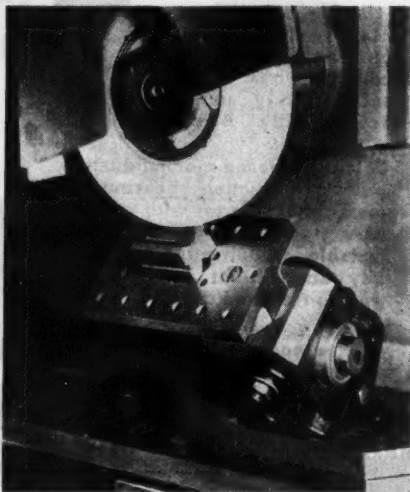


Illustration of Leahlill Grinding Fixture with milling cutter on locating button

bushing and then mounted on the fixture.

The small $3\frac{1}{2}$ x 5-inch surface plate furnished with the fixture is provided with numerous holes which can be used for holding parts to be milled or ground. If desired, a larger size surface plate can be used on the fixture, thus increasing the range of the unit. A bevel protractor is used in adjusting the fixture to the desired angles, thereby ensuring utmost accuracy of each setup.

The Leahlill Grinding Fixture is $6\frac{1}{4}$ inches high with surface plate in horizontal position, $5\frac{1}{2}$ inches wide and $9\frac{1}{2}$ inches long at the base.



Leahlill Grinding Fixture set up for grinding part held on surface plate



Chicago • Cleveland
Detroit • Dallas
Hartford • Houston
Indianapolis • Los Angeles
Memphis • Minneapolis
Milwaukee • Montreal
New York • Philadelphia
Pittsburgh • Rochester
San Francisco
St. Louis • Toronto
Windsor

FEDERAL

PRECISION MEASURING INSTRUMENTS

PRECISION MAGNIFIED

INSTANTLY Federal Indicator Gages tell you not only whether right or wrong... but **how much**. Tell you so clearly and positively no eye can miss.

And, Federal co-operation is so readily available you'll appreciate its suggestions for faster and better gaging.

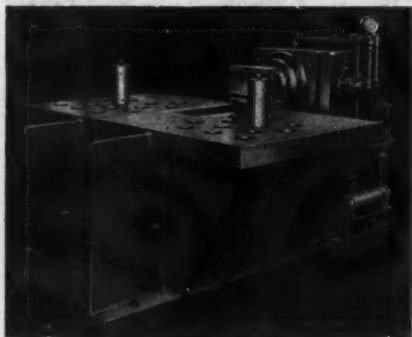
**Tell Us Your Needs. Federal
Will Meet Them.**

FEDERAL PRODUCTS CORP.

1144 Eddy Street Providence 1, R. I.

Beatty 35-Ton Hydraulic Bender

A 35-ton hydraulic bending machine for the bending, straightening, and pressing of pipe and miscellaneous form-



Beatty 35-Ton Hydraulic Bender

ing of light structural and welded shapes is now being built by the Beatty Machine & Mfg. Co., Hammond, Ind. The machine has a maximum operating pres-

sure of 2,000 lb. per square inch, advance and pressing speed of 40 inches per minute, and return speed of 130 inches per minute.

The ram of the unit is 12 inches wide x 9 inches and is provided with T-slots for mounting dies. The table, which measures 42 inches front to back and 72 inches left to right, is provided with 26 holes that allow for the location of 4-inch diameter bending pins in various positions on the table to facilitate bending and straightening of odd shaped workpieces.

The Beatty Hydraulic Bender is also available in other capacities ranging from 35 to 200 tons.

Lee "Cub" Heat-Treating Furnace

Especially adapted for toolroom use, a compact, electrically-heated, bench type furnace for hardening and carburizing tools, to be known as the "Cub," is now being produced by Industrial Furnace Division, Lee Grinder Co., 4708 Armitage Ave., Chicago, Ill. The furnace, according to the manufacturer, is particularly designed for use with accelerated carburizing salts. For hardening carbon steel tools, the unit is said to provide an

NEED GOOD COOLANT PUMPS?

BRADY-PENROD MODEL 7500
Centrifugal coolant pump and tank—a neat, compact unit highly suitable for use where abrasives are a factor.

Good pumps PAY. Buy the kind used as *standard equipment by many leading machine tool manufacturers*—BRADY-PENROD. Model 7500, shown above, is one of a complete line designed to meet every need. It handles all coolant liquids—kerosene, solubles, light and medium oils, etc., 4 to 100 g.p.m. Tank sizes, 6, 15, 30 gal. or larger, with as many hoses and nozzles as required. Discharge pipe is cast integral with pump and brought to outside of tank. The hinged cover allows cleaning without disconnecting return line.

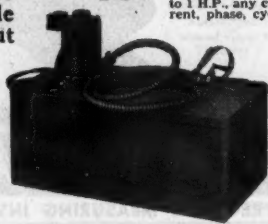
Brady-Penrod

Incorporated

1208 W. Second Street, Muncie, Indiana, U. S. A.
1945 Santa Fe Ave., Los Angeles, Calif.



All BRADY-PENROD pumps have heavy-duty, standard construction NEMA motors, ¼ to 1 H.P., any current, phase, cycle.



Snap-on PAR-V SCREW DRIVERS

Built to stand up under hard service, reasonably priced and now available, Snap-on offers its new line of "PAR-V" screw drivers. Pyralin handles, blades of high carbon steel, heat treated and tempered, tips accurately tapered, cross ground and machined for accurate fit. Complete range of sizes in both Standard and Phillips type.

Included in Snap-on's PAR-V line are screw drivers for every purpose, including Standard, Cabinet, Phillips head and Reed & Prince. Write for catalog.

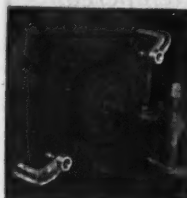
**SNAP-ON TOOLS
CORPORATION**

8032-J 28th Ave. • Kenosha, Wis.

Snap-on Tools
THE CHOICE OF BETTER MECHANICS

unusually satisfactory means, maximum hardness without warping being easily obtained.

The Lee Cub Heat-Treating Furnace is designed to operate at a maximum temperature of 1,600 deg. F. Regulation of the temperature for hardening carbon steel parts is provided by a control unit furnished as standard equipment with the furnace. The control unit combines switch, magnetic circuit breaker, and voltage control. The control can be set to "coast" the bath at a low temperature when intermittent operation of the furnace is required.



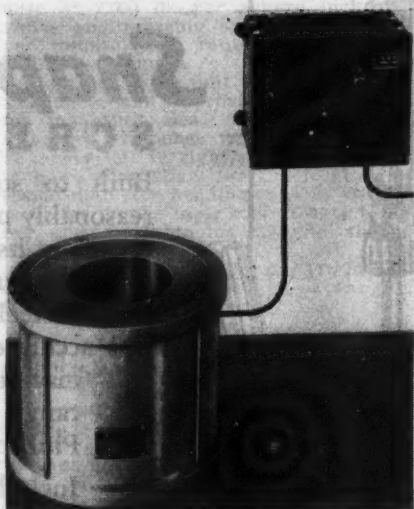
Cut Set-Up Time

75% through use of the
New Advance Clamps
(the only T-slot clamps)
Clamp directly over
work. For use on all
machines with T-slots.
Standard and Heavy-
Duty type.

Write for circulars.

ADVANCE MACHINE WORKS

3727 Weisser Park Fort Wayne, Indiana



Lee "Cub" Heat-Treating Furnace

Arranged for easy operation, the Cub is supplied with complete instructions

Have Your Plates Re-scraped

by a Nationally Known Surface Plate Manufacturer!



Equipped for precision
finishing by a staff of

Skilled Specialists

All Makes . . . Moderate Prices
. . . Prompt Service . . .

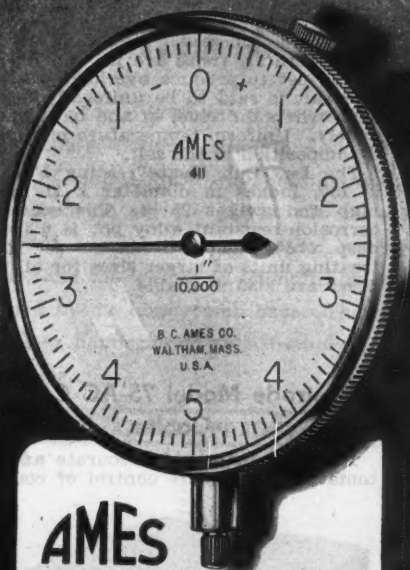
**Write for Quotation
and Literature**

Lapping Plates Made to Order!
Prompt Service!

SQUARE SURFACE PLATE & TOOL COMPANY

221 N. MAIN ST.

ROYAL OAK, MICH.



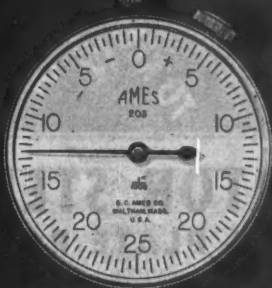
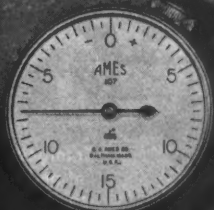
AMES
Hundred Series
DIAL INDICATORS

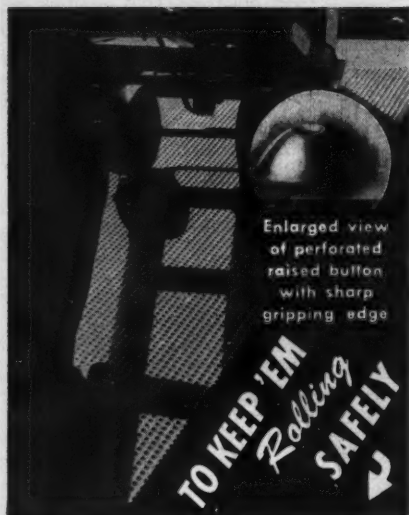
In four sizes with fourteen different dial graduations, indicating thousandths, half-thousandths or tenths of thousandths inches.

Speedy, accurate, inexpensive and adaptable to various measuring and testing jobs.

Write today for catalog.

B. C. AMES CO.
 WALTHAM, MASS., U.S.A.





Enlarged view
of perforated
raised button
with sharp
gripping edge

MORTON STEEL SAFETY PLATE RAMP

Don't allow slippery ramps to endanger men, trucks or war materials. Trucks roll safer, easier and faster on loading ramps with Morton Steel Safety Tread Surfaces that "grip men's soles." Upset buttons (see detail above) die formed and *perforated*, do not wear smooth nor retain oil, water, or other liquids.

Morton Steel Safety Tread Plates can be furnished in flat sheets, or may be stiffened with turned-down edges. Ramp Plates, portable or stationary, are also used to bridge pits, holes, etc.

HEAVY MACHINERY MANUFACTURERS: Increase safety. Save money by using Morton Steel Safety Treads for ladders, stairs, platforms and catwalks on your equipment. *Free Sample.*

MORTON MFG. CO., 5119 W. Lake St., Chicago, Ill.

MORTON
STEEL *Safety* TREADS

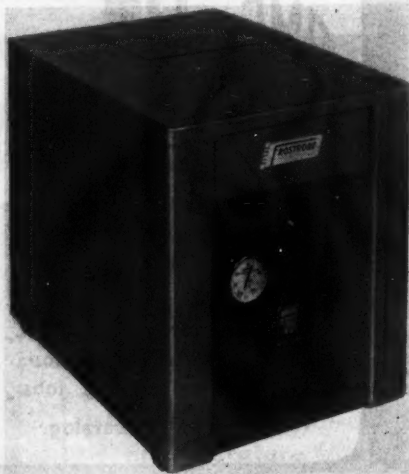
for use. With the unit, it is claimed, there is complete absence of scaling, since the work is at all times insulated from contact with the air.

The furnace can be operated intermittently or continuously on any 110-130 volt circuit, and, being electrically heated, the temperature of the unit is said to remain constant. According to the manufacturer, there are no "hot spots" in the pot to produce overheated areas. The salt is said to be uniformly heated even when the level of the bath varies widely. Uniform temperature minimizes decomposition of the salt.

The Lee Cub Heat-Treating Furnace is 13½ inches in diameter x 11 inches high and weighs 25 lb. The seamless, corrosion-resistant alloy pot is 6 inches deep x 6½ inches in diameter. Heat-treating units of larger sizes for all purposes are also available.

Frostrade Model 75-AC Coolant Cooler

Designed to provide accurate and automatic temperature control of coolants



Frostrade Model 75-AC Coolant Cooler

and lubricants used in performing machining operations, the Frostrade Model 75-AC Coolant Cooler pictured herewith has been brought out by Frostrade Products, 19003 John R St., Detroit 3, Mich.

E
IS
M

Me
for
arit
high
one
pla
trib
fac
tole

Size

3/4
6x
8x
8x
9x
10x
12x
12x
14x
16x
18x
18x
18x
20x
20x
24x
24x
30x
30x
31x
48x
48x

8x
10x

AC

Sept

PRECISION

IS BUILT INTO EVERY OUNCE OF THESE MEEHANITE METAL SURFACE PLATES

Meehanite Metal is of fine close grain, uniform texture, unusual strength and solidarity . . . metallurgical qualities that make high precision surface plates. These are one-third heavier than any other quality plates, and the weight is scientifically distributed by the honeycomb base. The surfaces are handscraped to extremely close tolerances.



LOOK
FOR THIS HONEYCOMB BASE!

Size	APPROX. WEIGHT	HEIGHT	TOLERANCE	NET PRICE
3 1/2 x 4	5 Lbs.	2 1/2"	.0001"	\$ 12.50
6 x 6	11 "	2 1/4"	.0001"	19.00
8 x 8	22 "	3"	.0001"	23.00
8 x 12	38 "	3 1/2"	.0001"	35.00
9 x 12	40 "	3 1/2"	.0001"	35.00
10 x 10	43 "	3 1/2"	.0001"	35.00
12 x 12	50 "	3 1/2"	.0001"	43.00
12 x 18	85 "	4"	.0001"	68.00
14 x 18	100 "	4"	.0001"	75.50
16 x 16	100 "	4"	.0001"	75.00
18 x 18	140 "	4 1/2"	.0001"	98.00
18 x 24	200 "	5"	.0001"	133.00
18 x 36	310 "	6 1/4"	.0002"	174.00
20 x 20	160 "	4 1/2"	.0001"	123.50
20 x 30	325 "	5 1/4"	.00025"	190.50
24 x 24	334 "	6 1/2"	.00025"	180.00
24 x 36	475 "	7"	.00025"	275.00
30 x 36	510 "	7"	.00025"	345.00
30 x 60	1425 "	10"	.00025"	596.50
31 x 78	2100 "	10"	.0003"	927.00
48 x 72	4500 "	12"	.0003"	1054.00
48 x 96	6000 "	12"	.0005"	1438.00

FOR PROPELLER INSPECTION: RIBBED PATTERN

8 x 42	238 Lbs.	8"	.0001"	98.00
10 x 36	225 "	6"	.0001"	115.70

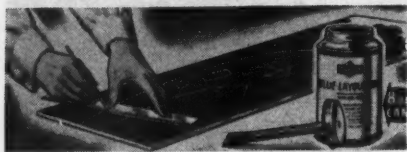
Other sizes to specification. Angle plates and straight edges of Meehanite Metal also available. Good deliveries on most sizes. Write for folder.

ACME TOOL COMPANY

202 CHURCH STREET
NEW YORK, N. Y.

According to the manufacturer, the unit is built for long trouble-free operation under continuous production service and has a rated capacity of 18 gallons of coolant per minute when cooled down to 20 deg. F. below room temperature. Adaptable to practically any type of machine and operation involving the use of coolants, the cooler is especially recommended for heavy cutting and high pressure grinding operations.

Work distortion due to unequal heating during grinding and other operations is said to be minimized through the use of the Froströde Model 75-AC Cooler.



TAMMS LAYOUT DOPE

Now offered in Blue, Black, Orange, Red

Speeds layout on all metals. Clean, accurate detail. Oil resistant. Won't chip, crack or flake off. Also ideal as a marking dye. Comes in 8 oz. brush-in cans, pints, qts., gals., drums. **SAMPLE FREE!**

TAMMS SILICA COMPANY

228-MS North LaSalle St.,

Chicago, Ill.

Coolant temperature can be readily selected by simply setting a dial on the control panel of the unit. According to the manufacturer, no attention is required by operator to maintain a continuous flow of coolant at the temperature selected, variations in room temperature being automatically compensated for by an integral differential thermostat.

An uninterrupted flow of coolant thru the cooler is said to be obtained by means of a single steel tube evaporator construction. Maximum heat transfer and compressor efficiency are provided through the use of a counter-flow principle in the evaporator unit. Coolant pressure drop in the cooler is said to be less than 5 lb. per square inch at full load.

Utilizing an air-cooled compressor, the Froströde Model 75-AC Coolant Cooler operates independent of water services and can be readily installed by simply rolling the unit up to the machine on its 2½-inch casters, connecting into the coolant line, and plugging into a convenient electrical outlet. Designed to occupy a minimum of floor space, the cooler can be furnished with "R.H.", "L.H.", or "strait-thru" coolant line connections. Dimensions of the cabinet are 30¼ x 22½ x 28 inches high.

Improved Air-O-chek MODEL FA AIR GUN



1. Only AIR-O-CHEKS have the ball and socket joint connecting the enclosed lever to the valve.
2. Long ferrules formed over special shoulders on air gun and fitting reinforce union with hose and seal end of hose against grease or oil.
3. Factory assembly on hose of special quality and weight assures easy operation and long, trouble-free service.

There's a reason for AIR-O-CHEK leakproof operation and long, trouble-free service.

It's the ball and socket joint connecting the enclosed lever to the valve, thus providing proper leverage to open the valve with a slight flex of the hose—no other air gun or blow gun has this feature.

Until you've used AIR-O-CHEK Air Guns you can't appreciate the easy, positive, almost magic operation that saves air, time, and maintenance. AIR-O-CHEKS are precision machined from bar brass and stainless steel. Made in sizes and types for all requirements. Write for literature.

AIR-WAY PUMP & EQUIPMENT CO.
403 S. JEFFERSON ST. CHICAGO 7, ILL.

THE RIGHT CUTTING TOOL FOR THE JOB

For every metal cutting job there is one type and size of special cutting tool that will do the work right.

Here, new methods—new equipment and appliances with a minimum of trained operators, speed production and improve workmanship of your special cutting tool orders. Note: we do not carry any tools in stock.

Send us your inquiries for quick estimates. New Bulletin sent on request.

Attractive territories available for capable agents.

Warren Industries

26667 Mound Road,
Warren, Mich.



WARREN INDUSTRIES



WARREN, MICHIGAN

"You can tell by the dot!"



PASSING THE WORD AROUND!

"Threadwell Taps? Sure, they're the ones with the dot. They have stepped up our production and lowered our threading costs."

Thus the word goes around.

Every high speed Threadwell Tap has a dot on the shank — red for cut thread, white for commercial ground, blue for precision ground. In the tool room or on the job, you can tell at a glance by the color of the dot.

And on the job, you can also tell a Threadwell Tap by its superb performance, its accuracy, its stamina. See your Threadwell distributor. He will give "personal attention" to your threading problems.

EXPORT STOCKING DISTRIBUTORS
CANADA: Bridge Machinery Co., Montreal
ENGLAND: Stylax Ltd., London



Threadwell
TAPS OF DISTINCTION

THREADWELL TAP AND DIE CO., GREENFIELD, MASS., U.S.A.

Standard compressor motors are designed for operation on 220/440 volts, three phase or 115/230 volts, single phase current and are rated at $\frac{3}{4}$ h.p., 60 cycles. Motors for other voltages and for 25 and 50-cycle current can be obtained on special order.

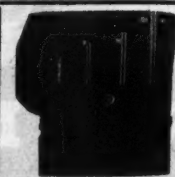
Acromark No. 924 Marking Machine

Manufactured by The Acromark Co.,
9 Morrell St., Elizabeth, N. J. the Acro-



Acromark No. 924 Marking Machine

mark No. 924 Marking Machine illustrated herewith is especially designed for use in marking condenser caps or covers. To produce this simple bench type unit, the company combined the principles of its Hercules type holder and Nos. 921 and 927 marking machines.



BORING BAR SET

4 BARS IN CASE
 $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, $\frac{1}{2}$ "

Price \$8.50

BALL POINT

WIGGLER \$1.35

Write for circular.



FLYNN MANUFACTURING CO.
437 BATES DETROIT, MICH.

**PROMPT DELIVERY
of Streamlined
BENCH CENTERS**

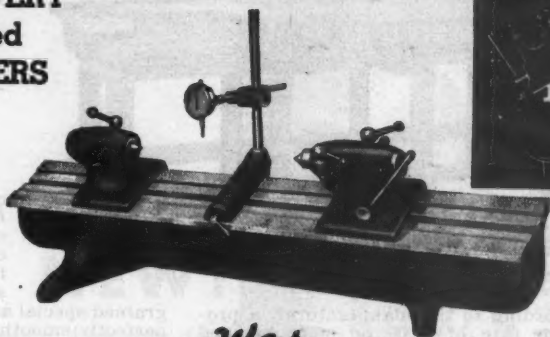
3 Sizes

8" x 36"

6" x 24"

4" x 10"

Also available with
riser blocks to increase
capacity.



War
"IN TIME OF PEACE"
Peace
PREPARE FOR WAR"

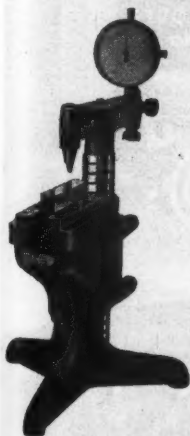
Where can you make a better investment right now, when war production is vital, and for the future, when peace promotes competitive conditions, than in American tools and gages to speed production?

American Bench Centers are an improved design. Box section bed supported on three feet—always sit solidly on bench. Inclined face allows more room for operator's hands—prevents misuse as "catch all" for tools. Both heads adjustable and locked by clamping lever. Spring operated foot stock on larger sizes—retracting lever permits removal of work without changing adjustment. Special gaging fixtures designed to meet special checking requirements.

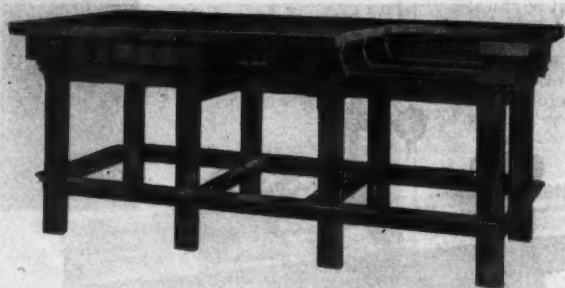
AMERICAN THREAD CHECKER

Checks threads on pitch diameter to "tenths." Takes work up to 5 in. diam. Furnished with $\frac{3}{4}$ " x 4" anvil or $3\frac{1}{4}$ " x $6\frac{1}{4}$ " platen. Special anvils and platens available to meet your requirements. Recommended and used by both manufacturers and users of thread grinding equipment.

Send for Bulletin 43-M for further details and data on
American Amplifying Gages, Hole Checkers, Radius
Dressers and Lapping Plates.



THE AMERICAN GAUGE CO.
125 Bayard Street DAYTON, OHIO



Challenge Layout Plate with
Clamp Edges

According to the manufacturer, a production rate of 2,000 or more marked pieces per hour can be obtained with one girl operating the machine.

Challenge Layout Plate with Clamp Edges

The Challenge Machinery Co., Grand Haven, Mich., is now introducing a lay-

out plate having overhanging edges on all four sides which allow for clamping work to top surface of plate at any desired point. Made of fine-grained special analysis semi-steel planed perfectly smooth and square, the plate is said to provide a true surface for layout, inspection, or assembly work. The plate is mounted on a sturdy all-steel stand which is equipped with from 28 to 40 lock type screws (depending upon the size of the plate) which enable the user to quickly level and firmly lock the plate.

The Challenge Layout Plate with Clamp Edges is made in four standard sizes of 36 x 72, 40 x 96, 48 x 96, and 48 x 128 inches. Other sizes may be obtained on special order.

Blade Breakage Stopped Production Insured

BY INSTALLING
PADDOCK Ball Bearing BAND SAW GUIDES

Recommended for New and Old Machines
cutting all material at any speed.

SENT ON 10 DAYS' TRIAL

The use of Paddock Ball Bearing Guides increases the efficiency of the machines so that more and better work can be done. The hazard of operation is reduced. Most of the blade breakage is eliminated. Wheels are interchanged—in effect, three sets of guides in one.

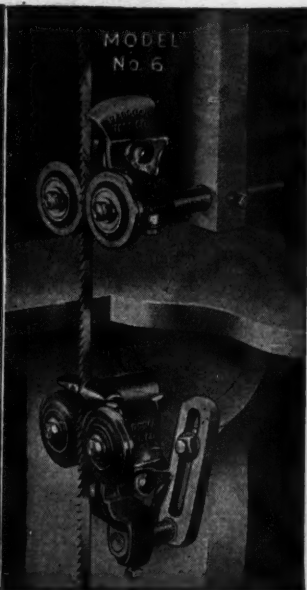
Write for details today and list of prominent manufacturers using Paddock Guides.

PADDOCK TOOL COMPANY

Guide Makers Since 1920

1418 Walnut St.,

Kansas City, Mo.



AS GOOD AS NEW!

Here's a bur with a history. Day after day, week after week, it has seen the toughest kind of usage cleaning up steel castings. But here it stands, now as good as new . . . ready to start life all over again. It has been restored and renewed . . . made as good as brand new by the Kellerflex Resharpening Process.

PRATT & WHITNEY CAN RESTORE YOUR BURS to their original cutting ability by this special process. It assures keen cutting edges, to precisely correct angles for deepest cuts with maximum chip clearance.

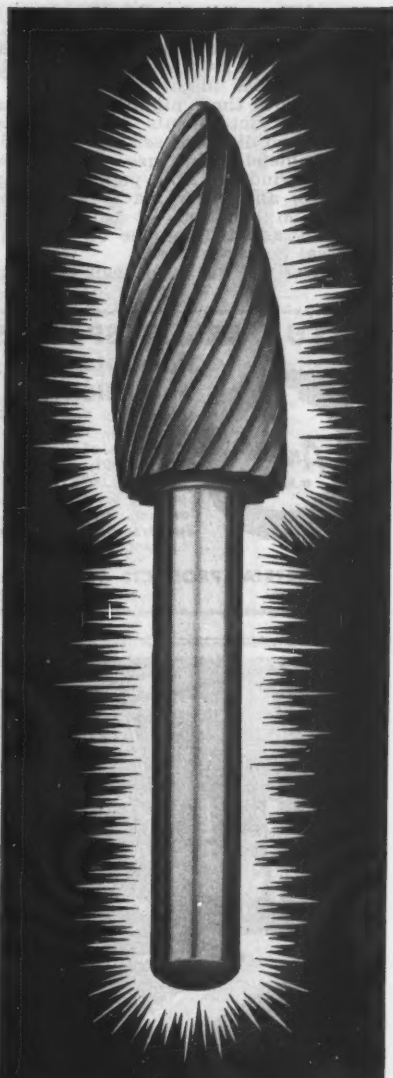
FASTER DELIVERY now possible. Enlarged facilities for resharpening burs assure prompt service without "waiting in line."

"DIAMOND BLUE" IF YOU WANT IT. If the burs you send us for resharpening are of high speed steel, we will gladly return them to you in the famous P&W "Diamond Blue." This means added heat treatment for longer life, tougher performance. Simply specify it on your order — no extra charge.

SEND US YOUR DULL BURS for a thorough application of that famous Pratt & Whitney Accuracy. Within a few days they'll be on their way back to you, good as new.



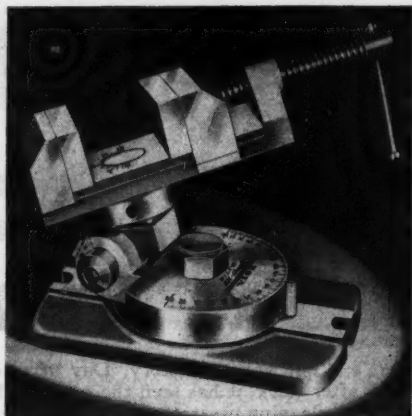
PRATT & WHITNEY
Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DEPARTMENT
WEST HARTFORD, CONN.



Hilco All-Angle Vise

Announced by the Berco Mfg. Co., 429 W. Superior St., Chicago, Ill., the Hilco All-Angle Vise illustrated herewith is provided with three highly accurate and legible protractor dials for horizontal, vertical, and diagonal settings. The vise is recommended for use on magnetic chucks, grinders, drill presses, milling machines, and other machine tools, as well as on benches. It is said to be especially adapted for use on the Hilco universal cutter-grinder.

Features of the vise include a pat-



Hilco All-Angle Vise

ARTUS ARBOR SPACERS

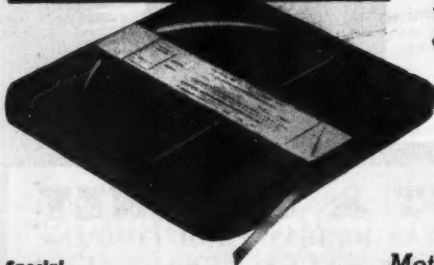


**The COLOR tells
the THICKNESS**

ARTUS Arbor Spacers made of plastic in various colors identify thickness at a glance! .001, .0015, .002, .003, .005, .0075, .010-.030. Speed up accurate fitting at low cost. Write for folder. **Spacers, Gaskets, Shims**
IMMEDIATE DELIVERY

INDUSTRIAL PRODUCTS SUPPLIERS
6 Broadway New York, N. Y.

ented "Driv-Wheel Movement" which provides vise with $2\frac{1}{4}$ -inch lateral clearance; double swivel construction which permits vise to be set in any horizontal position desired; right-angle clearance which enables vise to be adjusted per-



**Special
Containers
for narrow width
coils, 100' length.
Convenient to use.**

ATLANTIC ★ Band Saw Blades

**Speed Up
Metal Cutting Production**

Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

Send for Free
Booklet

**ATLANTIC
SAW MFG. CO.**

**Metal Cutting Band Saws
Exclusively**

155 Brewery St., New Haven, Conn.



MAGIC TYPE

Quick Change **CHUCKS**



BUILT FOR SPEED . . .

Change tools in your Drill Presses, Turret Lathes, and Boring Machines without stopping the spindles ... Save set-up time and add many stations to your machines by using Magic Quick Change Chucks.

By simply raising the locking ring, the centrifugal force throws two balls out of position, permitting the collet to drop out automatically.

Collets of various types can be furnished to accommodate Drills, Reamers, Boring Bars, Counterbores, Core Drills, Taps and Special Tools.

Our Tool Engineers will gladly assist you in adapting Magic Quick Change Drives to your production problems. Send us sketches or blue prints for recommendations and quotations.

Scully AND COMPANY **JONES**

1401 SOUTH ROCKWELL STREET • CHICAGO, U. S. A.

GAUGE MAKERS all over the country are standardizing on Smiths when **Precision Accuracy** is required. Smith **SURFACE PLATES** are **MASTERS.**



Smith Master Surface Plates

Smith Precision Lepping Plate

Elliptical Rib Construction Exclusive with Smith



Smith Stand

Available Sizes

8 x 12	18 x 24	30 x 36
9 x 14	24 x 24	30 x 60
12 x 18	20 x 30	36 x 68
18 x 18	24 x 36	★

★ Other sizes to order

For prices and delivery, write, wire or phone

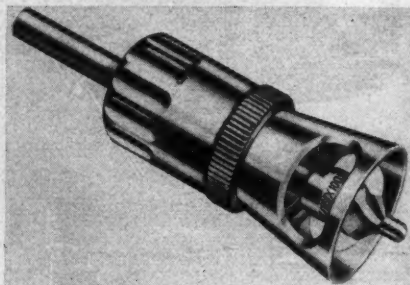
SMITH TOOL & ENGINEERING CO.
855 N. Sandusky Ave. Bucyrus, Ohio

pendicular to base; and elimination of excess weight and improved construction which provide for easy handling of vise by men or women workers.

The Hilco All-Angle Vise is made in three sizes having jaw widths of $3\frac{1}{2}$, $4\frac{1}{2}$, and 6 inches.

Aircraft Tools Model C Adjustable Stop-Countersink

Designated as the Model C, an adjustable stop-countersink that is said to require one-third the parts of the former



Aircraft Tools Model C Adjustable Stop-Countersink

model is announced by Aircraft Tools, Inc., 750 E. Gage St., Los Angeles 1, Cal. The shell housing is bell shaped and is larger in diameter, thus providing a greater bearing surface for keeping cutter square with hole. A ratchet stop, permitting easy depth adjustment of the tool by hand, snaps into position at each two thousandths of an inch. The positive lock-ring is said to maintain the

The BARNES Motor Driven Precision CUTTER GRINDING MACHINE

For Precision Grinding of Formed Milling Cutters used in the manufacture of rifles, pistols, etc.

GENERAL MACHINERY CORP.
140 Federal St., Boston, Mass.
Telephone Liberty 4826



STUDENT WELDERS

LEARN PROPER FLAME ADJUSTMENT FASTER



with
this natural color
oxyacetylene flame
adjustment chart



Student welders and "beginners" learn to make correct flame adjustments more quickly when guided by an Airco oxyacetylene flame-color chart. This helpful chart shows full color illustrations of the principal flames—the neutral flame used most frequently in oxyacetylene welding; the excess

acetylene flame; and the oxidizing flame used for welding copper and copper alloys.

We will be glad to send you, without charge as many copies of this chart as you need. Mail the coupon and please indicate the quantity you require.



60 EAST 42ND STREET, NEW YORK, N. Y.
In Texas: Magnolia-Airco Gas Products Co.

AIR REDUCTION Advertising Dept.
60 East 42nd Street, New York, N. Y.
Please send _____ copies of the full color
adjustment guide to:

Name _____
Position _____
Company _____
Address _____

Idle Cylinders Are Production Slackers: Keep 'Em Rolling for Victory!

same depth of cut regardless of jarring or rough use.

The drive shaft of the Model C adjustable stop-countersink operates in Oilite bearings and is provided with a ball thrust bearing to take up shocks and ensure accuracy and long life. The cutter is made from high speed tool steel and is accurately ground with correct cutting angles. The Model C is available in two cutter sizes— $\frac{1}{4}$ and $\frac{3}{8}$ inch—employing the same pilots as former models marketed by the company.

Champion Expanding Mandrels



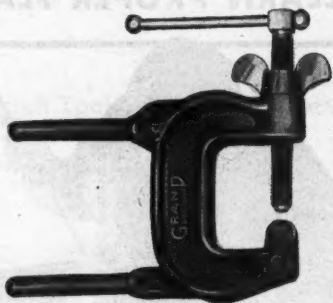
$\frac{1}{2}$ " to $6\frac{1}{2}$ "
Efficient—
Dependable—

Write for circular

**THE WESTERN TOOL
& MFG. CO.**
Springfield • Ohio

Grand Clamps

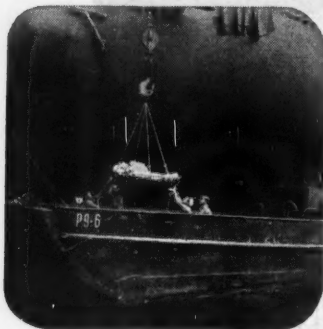
Grand Specialties Co., 3132 W. Grand Ave., Chicago, Ill., announces the introduction of three clamps to be known



Grand Quick Lockset Clamp

as the Grand Quick Lockset, Grand Heavy Duty Speed, and Grand Alloy-Steel Standard "C" Clamps.

The Grand Quick Lockset is designed

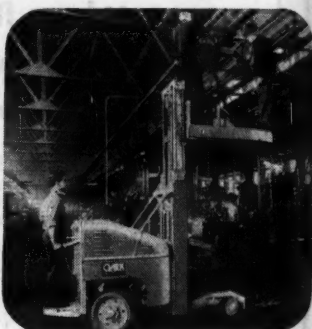


**Let Our Hospital
Ship Experience
Help With Your
Post War Designs**

SEND FOR
THESE
HANDY
BULLETINS
ON POWER
TRANSMISSION
CONTROL



Show helpful application diagrams. Give capacities, dimensions and specifications.



PULLMORE CLUTCHES



Rockford Drilling Machine Division

Borg-Warner Corporation
300 Catherine St., Rockford, Ill.

USE ROCKFORD INDUSTRIAL CLUTCHES FOR SUPERIOR PERFORMANCE AND ECONOMY

Machine Tools	Process Machinery	Farm Implements	Materials Handling	Earth Movers	Service Machinery	Power Units

Pullmore Multiple-Disc Clutches • Over-Center and Spring-Loaded Clutches • Power Take-Offs

WAR PLANE SPECIFICATIONS REQUIRE TORQUING

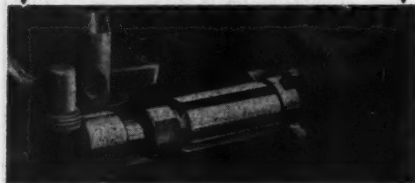
Modern manufacturing methods call for controlled "settings" of vital nuts, screws, bolts, hydraulic fittings — of almost all threaded parts. Leading American aircraft and engine builders almost universally use the permanently accurate STURTEVANT TORQUE WRENCHES for innumerable applications ranging from building precision instruments to testing frictional drag in controls and motors. 50 models, capacities ranging from 0 to 5 inch pounds on up to 7200 inch pounds.

**Write for
catalog sheets.**

Model F-100-1
(Capacity 0-100 in. lbs.)
Illustrated.

P.A. **STURTEVANT** CO.
ADDISON **QUALITY** ILLINOIS

Equip Your Shop With NICHOLSON EXPANDING MANDRELS



Time-Saving Economy Tools!

TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
1A	$\frac{1}{2}$ " to 1"	\$12.00
2A	1" to $1\frac{1}{2}$ "	16.00
3A	$1\frac{1}{2}$ " to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00



TYPE B—STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	$\frac{1}{2}$ " to $\frac{3}{4}$ "	\$10.00
2X	$\frac{3}{4}$ " to $2\frac{1}{32}$ "	11.00
3X	$2\frac{1}{32}$ " to $\frac{3}{4}$ "	12.00
00	$\frac{3}{4}$ " to $\frac{7}{8}$ "	14.00
0	$\frac{7}{8}$ " to 1"	16.00
1	1" to $1\frac{1}{8}$ "	18.00
2	$1\frac{1}{8}$ " to $1\frac{1}{4}$ "	21.00
3	$1\frac{1}{4}$ " to 2"	29.00
4	2" to $2\frac{1}{2}$ "	40.00

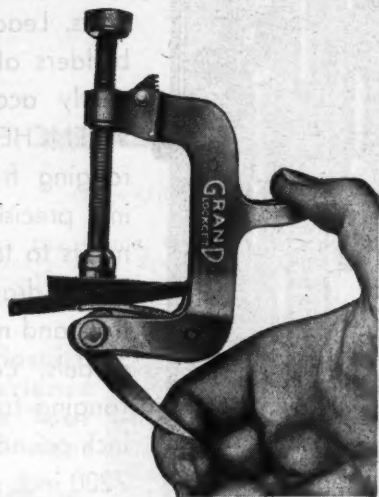
(Other Sizes Taking Up to 7" Bores)

Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.

W. H. NICHOLSON & CO.

136 Oregon Street Wilkes-Barre, Pa.

for clamping light work and is provided with an instantaneous trigger release. The seat of the clamp has a swinging, locking lever gib which is said to make the clamp absolutely noncreeping and to assure a firm grip on parallel, slanting, or rounded surfaces. The release trigger is equipped with powerful teeth which, under spring tension, provide a firm ratchet grip on the clamp screw. The grip on screw is instantly released by means of thumb or finger pressure on the trigger, thus enabling screw to be



Grand Heavy Duty Speed Clamp

slipped to any desired position with a single motion for immediate resetting.

The Grand Quick Locket Clamp has a free-acting swivel with fiber face to prevent scarring or marring work, and may also be obtained with fiber jaws for clamping aluminum and other soft metals. Both types are made in three sizes and have copper plated screws and swivels to prevent damage from weld spatter.

The Grand Heavy Duty Speed Clamp is designed for clamping large, heavy work and is a two-handed, lever-operated unit which is said to be ideal for production use on identical workpieces. By means of a combination screw and lever action, the clamp can be set and locked for any given opening and instantly applied and released from work. This clamp is also available in a giant size with $10\frac{1}{2}$ -inch opening.

The Grand Alloy-Steel Standard "C" Clamp is made in various sizes and is

GEMCO

SHAPERS



Exclusive
"LUBRIGARD"
Prolongs the
precision life.
Found only on
"GEMCO"

Extreme Accuracy
with "GEMCO" SHAPERS

Precision Parts to
PEAK MACHINE CAPACITY
even by operators new to industry is
an indication of Gemco Shapers ac-
curacy.

Lubrigard insures adequate lubri-
cation maintaining accuracy dur-
ing a lifetime of profitable operation.
Available in Plain, Production, and
Universal types. Up to 24" stroke.

Write for Bulletin GC-12M.
GOOD DELIVERIES

GENERAL ENGINEERING & MFG. CO. ST. LOUIS
MO.

POWER SCREWDRIVERS

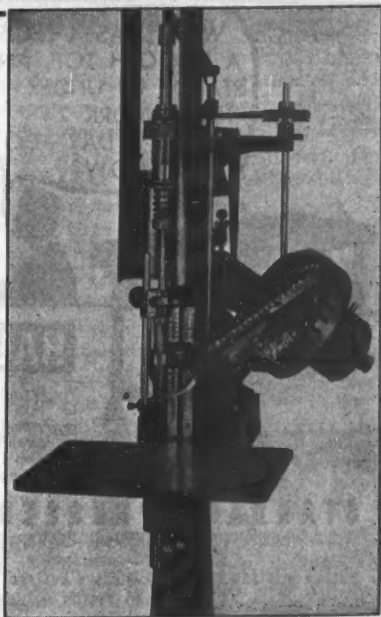
**Production Machines
For War Jobs**

MACHINES WILL DRIVE STANDARD
OR SPECIAL SCREWS AT ONE
SECOND EACH.

THREE MODELS
No. 2 to $\frac{3}{8}$ Diameter Screws

Send Sample Assemblies for Production
Estimates and Prices.

DETROIT POWER SCREWDRIVER CO.
2807 W. Fort St. Detroit, Mich.



intended for general use where the extra weight of heavy duty clamps is not required. The clamp has replaceable ball and socket swivel, and the hardened screw and vise type handle are copper plated to resist adhesion of weld spatter.

Palmer-Shile Bar Stock Sling

To facilitate the handling of bar stock, rods, angle iron, heavy tubing, and similar materials, the Palmer-Shile Co., 786



PRESSES
FEEDS
AUTOMATIC
EQUIPMENT

THE V & O Press Co.

HUDSON, N. Y.



Palmer-Shile Bar Stock Sling

S. Harrington, Detroit, Mich., has developed the bar stock sling shown in the accompanying illustration. Built of heavy stock, strongly braced and reinforced, the sling is designed to handle loads weighing up to 2,000 lb. The unit

WHAT HAS 4 LEGS
A SMOOTH TOP, AND
STANDS UP UNDER
HARD WORK 24
HOURS A DAY—DO
YOU KNOW?

I'LL TELL THE
WORLD—IT'S A
"HALLOWELL"
WORK-BENCH



Fig. 1117.
Drawer is extra.
Pat'd. & Pats. Pend.

HALLOWELL SHOP EQUIPMENT

You'll find "Hallowell" Work-Benches strong and sturdy—decidedly able to "take it." Whatever your work-bench needs, we can fill them. 1367 ready-made interchangeable combinations. Where use of steel shop equipment is prohibited by wartime restrictions, there are "Hallowell" Duration Type Wood Work-Benches, like that pictured below. Deliveries now being made quite promptly. Write today for full details.

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 556

— BRANCHES —

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO
OVER 40 YEARS IN BUSINESS



Fig. 1969
Drawer is extra.

The UNIT HEATER

*that will last longer
than Other types of
Heating Equipment*

Cast Iron Series Grid Unit Heater becomes permanent equipment, once installed, and will operate efficiently year after year — without maintenance expense. Its lower outlet temperatures with greater air volume and more air changes per hour assure comfort in the working zone at lower fuel cost.

Engineered and tested to operate with either steam or hot water, up to 250 lbs. steam pressure. Each "fin" heating section is made of high test cast iron to cooperate with the war effort (the standard Grid from 1929 to 1942 was made with aluminum heating sections). No electrolysis to cause corrosion...no leaks...no breakdowns...no heating failures. Catalog and capacity tables upon request.

D. J. MURRAY MFG. CO.
Wausau, Wisconsin



Offices in All
Principal Cities

NOW *Speed up* PRODUCTION WITH FAMCO PRESSES

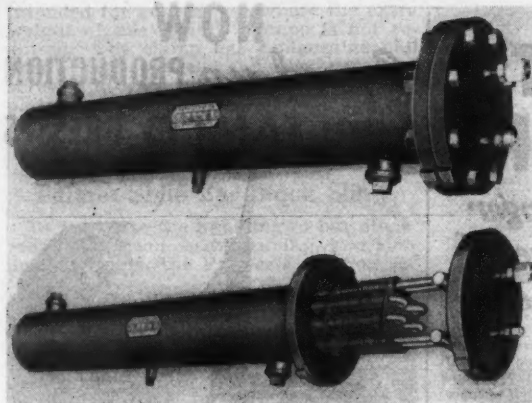


This Famco Arbor Press is flaring insulation on armature cores of Dumore Aeromotors... another example of how Famco Presses speed production in America's war plants. Only Famco Arbor Presses have adjustable gibs for perfect ram alignment.

40 stock sizes and models, floor and bench types. 1/2 to 15 tons pressure. Write for complete facts on the full line of Famco Arbor and Foot Presses. Famco Machine Co., 1324, Racine, Wisconsin.



famco
FOOT AND ARBOR
P R E S S E S



Kramer Coolant Cooler

Kramer Trenton Co., Trenton 5, N. J. The cooler consists of a spiral fin cooling coil tested under 300 lb. per square inch pressure which is inserted into a steel shell that has been tested under 200 lb. per square inch pressure. The unit is provided with a bolted flanged lid to allow for easy removal of the cooling coil for cleaning purposes. The coolant circulates at proper velocities by means of suitably spaced baffles.

measures 5 feet in length and weighs approximately 50 lb. The cradle is 10 inches wide x 8 inches high.

Kramer Coolant Cooler

A coolant cooler of the shell and fin tube type has been developed by the

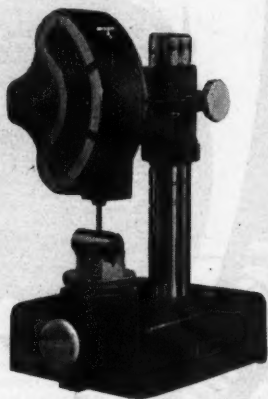
The Kramer Coolant Cooler is designed for use with water, brine, or direct expansion refrigerant. If coolant temperature is held below room temperature, the lines and unit should be insulated. If, however, the coolant is held above room temperature, no insulation need be used. The cooler is available in various capacities and can be furnished with brackets

AMIC Comparator

A PRECISION INDICATING GAGE

Designed to replace special gages, flush pin gages, snap, height gages. For accurate, convenient and quick checking of components, either in the tool room or on the production line. Permits precise gaging throughout the whole day without eye fatigue. Each division of the scale represents 1/10,000th of an inch. Interpolations of .00005 easily achieved. Clear readings on 6" scale with inch and millimeter readings. Magnification is 1000. Measuring capacity is $\pm .003$ " and $\pm .05$ mm.

Note our improved list of accessories designed to suit your particular measuring problems. Thread measuring device, serrated anvil, vee-blocks, centering fixture, ball anvil and several types of backstops.



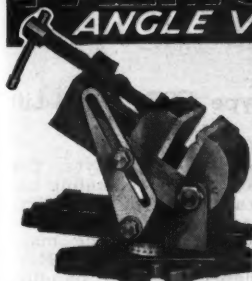
Our extensive experience will solve your measuring problems

AMERICAN MEASURING INSTRUMENTS CORP.
240 West 40th St. New York, N. Y.

Manufacturers of Gages, Jigs, Fixtures, Service Tools and Precision Units

PALMGREN

ANGLE VISES



**DRILLING
MILLING
GRINDING
FILING
FITTING
MARKING**

Solve Difficult Angle Job:

- * For Tool Room—Production Line—Bench
- * Speed up work—End Makeshift Methods.
- * Quick Accurate Setups at any angle.
- * Sturdy Longlife Construction.
- * All Parts Accurately Machined.
- * Jaws Hardened Steel—Plain or Grooved.
- * Made in Sizes from 1 1/2" to 8" Jaws.

Write for circular R-3 "101 Angle

PALMGREN Vises.

CHICAGO TOOL & ENGINEERING COMPANY

Mfrs. of PALMGREN PRODUCTS for over 25 years
8399 S. Chicago Ave. Chicago, Ill.



PRECISION WORK AT ANY ANGLE

On The Level

they're better!

Simplex Machinists' Jacks speed leveling of work on planers, milling machines and other machine tools. Notched base for fastening to bed. Self-leveling ball and socket cap. Side lock nut holds screw at desired height. 4 sizes: 2 3/4", 3 3/4", 5 1/4" and 7 1/2" closed heights.



Ask your machinery dealer.

**Templeton, Kenly & Co.
Chicago, Illinois**

Better, Safer Jacks Since 1899



Simplex

LEVER SCREW HYDRAULIC

Jacks

METAL Stampings

WITHOUT

DIES

If you desire to save time and critical materials on production of metal stampings or other small parts, then the DI-ACRO System of "Metal Duplicating Without Dies" merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.

Send for this catalog "METAL DUPLICATING WITHOUT DIES"



SHEARS



BRAKES



BENDERS

O'NEIL-IRWIN  **MFG. CO.**

306 EIGHTH AVENUE SOUTH • MINNEAPOLIS 15, MINNESOTA

Parker Vises Help TWA Put 'Em Back in the Air ... FAST!



TWA's maintenance department is organized to turn out precision work at high speed... its layout is arranged for high efficiency... its machinery and tools selected as best suited for the job.

That's why TWA's use of Parker Vises is so significant. Working on airplane parts, a vise slip may mean a spoiled unit. TWA plays it safe... picks Parker Vises to protect against waste of materials and loss of valuable time. The Charles Parker Company, Meriden, Conn.

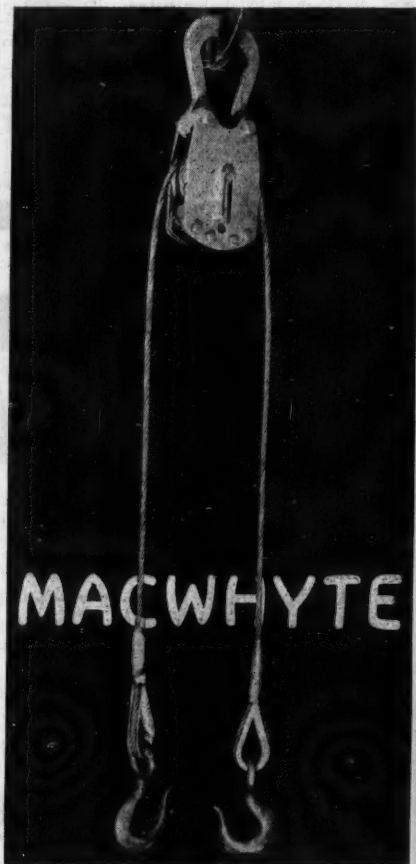
Handled by Leading Distributors

PARKER VISES
AMERICA'S OLDEST

which allow for mounting on floor, wall, or ceiling.

Macwhyte Type CSE "Level-Lift" Sling

Designated as the Macwhyte Type CSE "Level-Lift," a wire rope sling having a special feature which enables the sling to equalize itself and lift unbalanced loads level is now being manufactured by the Macwhyte Co., Kenosha, Wis. Designed for easy handling, the sling is said to be especially useful



Macwhyte Type CSE "Level-Lift" Sling

DIAMONDS *for Victory*



Cooler dressing
Closer tolerances
Micrometer Accuracy
Because: Wing key
heat dissipation
and absolute diamond
lock nib.

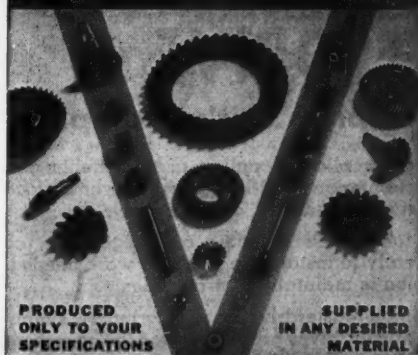
• Three grades of diamonds. Common quality \$12 per karat. Medium quality \$24 per karat. Select quality \$48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

• All diamond sizes $\frac{1}{4}$ to 10 karat are nib mounted for immediate shipment . . . Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, \$1.00 post paid.)

Write for Catalog showing Most Complete Line of Diamond Tools for War Production

DIAMOND TOOL COMPANY, Not Inc.
Sheldon M. Booth, Pres.
938 E. 41st Street CHICAGO, ILL.

PRECISION GEARS $5\frac{1}{16}$ to 16"



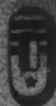
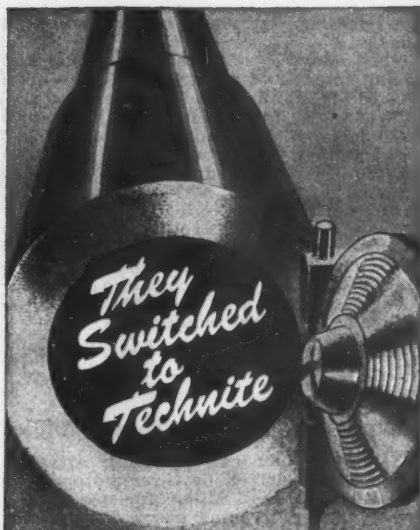
PRODUCED
ONLY TO YOUR
SPECIFICATIONS

SUPPLIED
IN ANY DESIRED
MATERIAL

DETROIT BEVEL GEAR COMPANY

8130 JOS. CAMPBELL AVE.
DETROIT, MICH.

Makers of Quality Gears for 30 Years



no munitions producer, after running tests, switched to Capewell's **TECHNITE** hack saw blades for cutting 12" x 15" breach block stock. It is likely that you, too, face difficult cutting problems. Simply ask your mill supply man about Capewell.

CAPEWELL

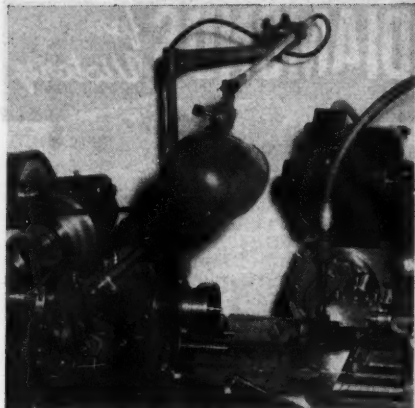
The Trend is to **TECHNITE**
The Molybdenum High Speed
Hack Saw Blade

THE CAPEWELL MFG. CO., HARTFORD, CONN.

in hoisting long pipes, boxes, steel, and flasks.

The Macwhyte Type CSE Level-Lift Sling consists of a single piece of $\frac{1}{4}$ -inch 6 x 36 IWRC Monarch Whyte strand preformed wire rope of any length required which operates through a block mounted on a crane hook. The equalizing feature comprises a floating sheave or drum having a braking action to arrest leg adjustment after the load is lifted.

The Type CSE Level-Lift is designed for handling loads up to 3 tons. When used in pairs, loads up to 6 tons can be handled. Flame-cut hooks and flame-cut anchor hooks are available with the sling as auxiliary equipment.



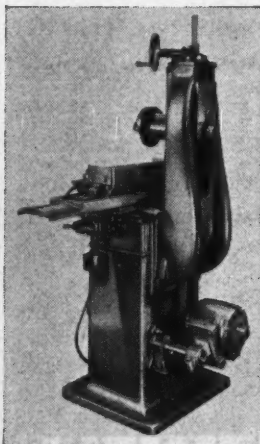
Lamp for Waltham Thread Miller

Lamp for Waltham Thread Miller

A lamp which can be readily attached to any belt-driven or three-motor drive Waltham Thread Miller for use in setting cutter, changing gears, making adjustments, loading and unloading, and so on, is announced by the Waltham Machine Works, Waltham 54, Mass. The arms and reflector of the lamp are adjustable, thereby enabling light to be di-

rected exactly where needed.

Approved by National Board of Fire Underwriters, the lamp is supplied complete with extension wire and plug, sketch and instructions for assembly and mounting, and necessary screws.



TO IMPROVE PERFORMANCE . . . equip your surface grinders with **MASTERDRIVE** . . . it's simple . . . it's complete

By eliminating complicated pulley arrangements and costly lineshaft maintenance, Masterdrives power surface grinders for maximum efficiency and economy.

Masterdrives for surface grinders are engineered as complete units ready to install. No machine work needed. Proper belt tension is maintained at all times.

For information on Masterdrive for your grinders, simply state the make. Masterdrives are supplied in 750 specifications for practically every machine tool drive requirement. Phone, write, or wire today!



MASTER ELECTRIC CO.
INDUSTRIAL EQUIPMENT DIVISION • DAYTON, OHIO



HOWE DRILL GRINDER

**Quick
Delivery**

... for accurately grinding drills, tool bits, etc., for better and more accurate work. Does not require a skilled operator.

Capacity: drills from $\frac{1}{8}$ " to

$1\frac{1}{4}$ ". Larger holder takes drills to $2\frac{1}{4}$ ". Cup wheel, 6" dia. Straight face wheel, 6" x $\frac{3}{4}$ ". Write for complete details on HOWE Drill Grinders, Automatic Saw Sharpeners and Tool and Cutter Grinders.

HOWE & SON, INC.

HINSDALE, N. H.

GRANT

RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{2}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles.

Write for literature—and 'don't forget to send samples.

THE GRANT MFG. & MACHINE CO.

96 Silliman Ave.

Bridgeport, Conn.

How many holes in YOUR production could you plug with a good, all-purpose

FOOT PRESS?

Look around your shop. Figure the time and money you could save with one or more dependable FOOT PRESSES. Then write for Bulletin giving full specifications of FERRACUTE'S New Series FOOT PRESSES. Low in cost but backed by the famous FERRACUTE name.

For utility or production:—

Forming—
Cutting—
Piercing—
Riveting—
Stamping

New Series

FOOT PRESSES



1-TON, 2-TON, 3-TON, PEDESTAL OR BENCH MODELS

FERRACUTE MACHINE COMPANY

BRIDGETON, NEW JERSEY

For over 80 years

Manufacturers of Power Presses, Press Brakes, Special Machinery



READ WHAT

George E. O'Neill

Safety Engineer of Bendix

MARINE DIVISION

THINKS ABOUT SPEEDI-DRI

OIL AND GREASE ABSORBENT

Writing to the Editor of a safety magazine, Mr. George E. O'Neill, Safety Engineer of the Marine Division of Bendix Aviation Corporation, says, in part: "Oil absorption by the use of sawdust . . . is both unsanitary and inflammable, creating a great fire hazard. Prior to the use of SPEEDI-DRI we risked this unhealthy condition but now our floors and platforms are kept continually clean with SPEEDI-DRI. I believe that facts about products of this nature should be passed on to others . . ."

Mr. O'Neill might also have added that SPEEDI-DRI provides an immediate, non-skid surface, soaks up oil and grease from wood, steel, or concrete floors, brightens up the plant, saves shoes from oil rot, protects workmen's feet. By its ease of application and removal, SPEEDI-DRI saves vital manpower and cleaning costs. No expensive machinery or scouring compounds are necessary.



Write for a free, testing sample.

SPEEDI-DRI
OIL AND GREASE ABSORBENT



SUPPLIERS

East — REFINERS LUBRICATING CO.
New York 1, N. Y.

Midwest and South
WAVERLY PETROLEUM PRODUCTS CO.
Philadelphia 6, Pa.

West Coast
WAVERLY PETROLEUM PRODUCTS CO.
Russ Bldg., San Francisco 4, Calif.

Force Bench Type Hand-Operated Roll Marking Machine

The illustration herewith shows a bench type hand-operated roll marking machine for numbering and marking thin walled cylindrical and beveled edge parts which is now being manufactured



Force Bench Type Hand-Operated Roll
Marking Machine

by Wm. A. Force & Co., Inc., 222 Nichols Ave., Brooklyn, New York.

Using a locating anvil, the parts to be marked are rolled in synchronization with a standard roll type holder or convex indenting head. The unit shown is equipped with a standard roll type holder with interchangeable type for producing various lot numbers on workpieces. Parts to be marked can be loaded at the end of each stroke of the machine handle, thus enabling one piece to be marked on the forward stroke and another on the return stroke of the handle. According to the manufacturer, inexperienced operators can mark 600 or more pieces per hour with the machine.

ated

s a
cking
cking
edge
ured

*Need an
Extra
Hand?*

**Transfer Points Insure
Accurate Layouts In Die Making**

A real helping hand! Heimann Transfer Screws are quick, accurate markers in setting dies. No wrench needed. Six hardened screws nested in holder (see below). Uniform height hex base to point, insuring clear uniform indentations.

Send for circular.

PRICES Per Set	
3/16"	...\$1.50
1/4"	... 1.20
5/16"	... 1.25
3/8"	... 1.35
7/16"	... 1.40
1/2"	... 1.50

**Also
S.A.E.**

**HEIMANN MFG. CO.,
URBANA, OHIO**

**THE HILLIARD
OVER-RUNNING CLUTCH**

A "Free Wheeling" Clutch of simple design recognized for many years as "Standard Equipment for Automatic Dual Drive Operation - Automatic operation of 2 speed drive - As a ratchet permitting infinite adjustment and as an automatic backstop. Furnished in a number of types.

★
**THE HILLIARD CORPORATION
117 W. FOURTH ST., ELMIRA, N.Y.**

HILLIARD CLUTCHES

BUILDERS' T' SURFACE GRINDER

Patented T-square action guides table longitudinally and transversely... eliminates intermediate table. Extreme accuracy and a high quality finish are assured by single precision-ground table bearing, resting on plane ground surface of the bed with but one oil film subject to grinding pressure.

**Prompt Delivery
Send for Bulletin 644**

BUILDERS IRON FOUNDRY
19 Codding St.
Providence,
R. I.

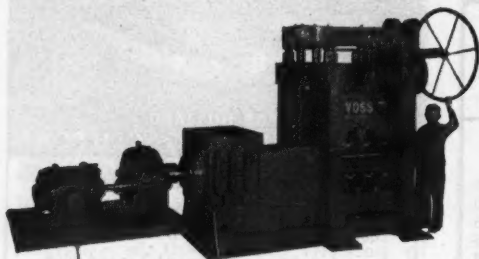


ich-

o be
tion
con-
n is
lder
cing
arts
end
dle,
ked
on
Ac-
peri-
ore

Improved Voss Ungerer Roller Leveler

The illustration herewith shows the improved Voss Ungerer Roller Leveler which has been brought out by the Voss



Improved Voss Ungerer Roller Leveler

Machinery Co., 2856 W. Liberty Ave., Pittsburgh, Pa. This machine is said to have all the features and advantages of former Voss Ungerer Roller Levelers but to be more heavily constructed and to be particularly adapted to the straightening of armor plate.

The machine shown is designed to handle up to $\frac{3}{4}$ -inch armor plate in continuous sheets and other types of steel plate up to 1 inch thick. It can also be built to handle much thicker and wider plates.

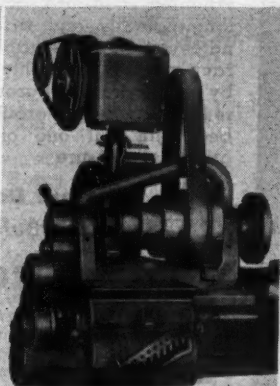
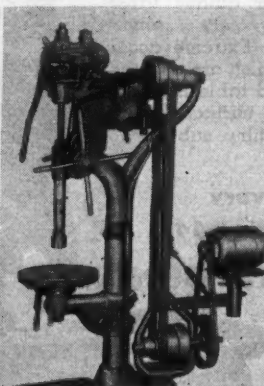
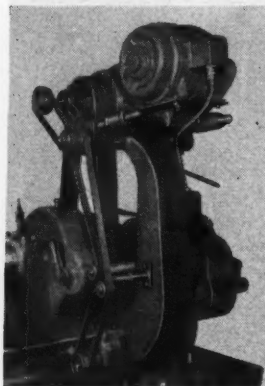
Leiman Vacuum Chucking System

Designed for use in performing grinding, polishing, sanding, or other operations on metal, glass, plastic, wood, and other materials, a chucking system utilizing a strong suction of air for holding workpieces firmly for machining is announced by Leiman Bros. Inc., 1D-138 Christie St., Newark, N. J. The vacuum chucking system shown herewith comprises a flat, stationary and round, rotating chuck attached to a vacuum pump. The rotating chuck is designed for lathe work while the flat chuck may be used for most other types of work.

The vacuum pump can be furnished in a number of sizes, depending upon

**Want to Increase ?
Production**

BERKELEY POWER DRIVES
will quickly convert your sluggish lineshaft equipment into Modern Machine Tools



Write,
'Phone or
Wire

BERKELEY EQUIPMENT COMPANY
Danville, Illinois

U. S. HEADS

STANDARD SINCE 1915

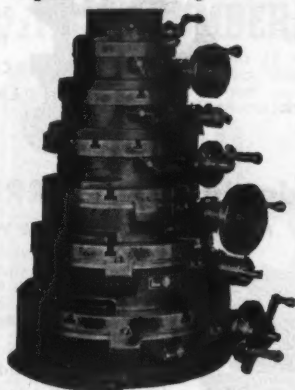


Two Spindle Head
Both Spindles
Adjustable

The United States Drill Head Co.

1954 Riverside Drive
CINCINNATI, OHIO

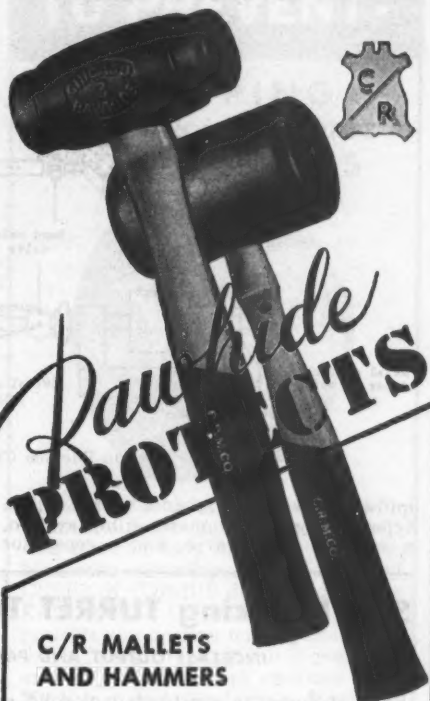
Troyke Rotary Tables



Sizes 9", 12", 15", 18"

Ask your dealer or write us for
eight page catalog.

ALFRED A. TROYKE
4422 Appleton St. Cincinnati, Ohio



C/R MALLETS AND HAMMERS

permit forceful, effective blows without battering, scarring or marring. They protect fine finishes, delicate insulation, hardened parts and costly machinery. They far outlast other mallets, hold a true striking face and, because they absorb recoil, they are less fatiguing on continuous use operations (as pounding in winding, assembly work, etc.). Speed production—reduce spoilage. All sizes. Weighted or unweighted.

Replaceable Heads

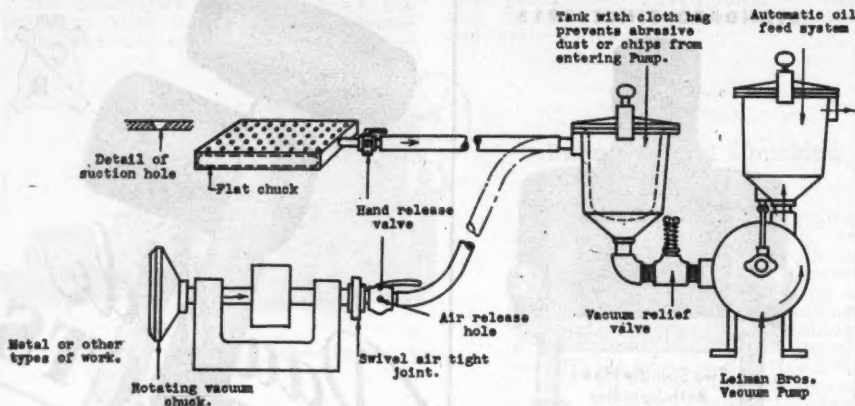
Replaceable Insert Faces
are available for C.R.
Hammers... make each a
"lifetime" tool.

CHICAGO Rawhide MFG. CO.

1281 ELSTON AVE. CHICAGO, ILLINOIS

the size and weight of the pieces of work and the speed of operation re-

to prevent foreign matter from being sucked into the pump. Any size vac-



Leiman Vacuum Chucking System

quired. The pump is of a motor-driven type having an automatic oiling system, a vacuum relief valve, and a separator

um chuck may be used, with hand-operated release valve for quick changing of workpieces. Holes of the chuck

Self-Indexing TURRET TOOL POSTS

INCREASE OUTPUT AND PROFITS

Body of Turret is constructed of solid steel and indexes for eight positions, two for each tool.

We have a size and style to fit your lathe and work requirements.



SAVE
TIME
COST
LABOR

HEAVY DUTY Self-Indexing BED TURRETS

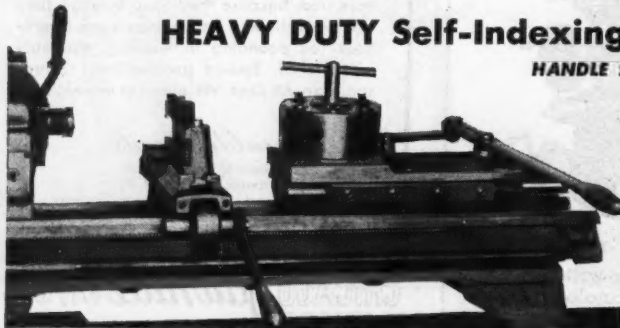
HANDLE SCREW-MACHINE WORK

Complete unit with cut-off cross slide and tool posts designed for Craftsman, Powercraft, Logan, South Bend, Atlas and similar types of bench lathes.

Has 6" head and 5 1/2" turret travel.

Bed turrets with pilot wheel for large lathes built to order. Let us know your needs.

Write for Circular and Name of Nearest Jobber.



LYNN MANUFACTURING CO., 219 Elroy Street, Minneapolis, Minn.

AUTOM



CONTINUOUS HINGES

Manufactured by

**AUTO MOULDING
& MFG. CO.**

WRITE FOR STOCK LIST

2326 S. CANAL ST.

CHICAGO 16

Mark It Quickly with a **NUMBERALL**



Made with 1 to 10 wheels.
Stamp in perfect alignment.
Shank for Hand or Press
Stamping. Platform for stamping
Name Plates and
other small
articles.



No. 45
Platform

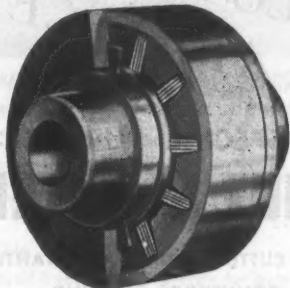
NEW Quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

**NUMBERALL STAMP
& TOOL CO.**

Huguenot Park,
Staten Island, N. Y.

TO PREVENT -

STOPPING PRODUCTION MACHINES FOR REPAIRS

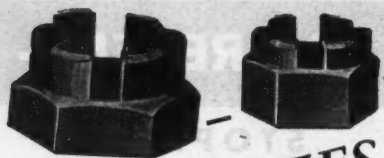


If you want steady, uninterrupted production — lower machine-repair costs and freedom from misalignment troubles, take advantage of the long-lived **CUSHION TORQUE** developed by the **KANTI-LEVER COUPLING**. It not only protects you against misalignment like the ordinary coupling, but it goes several steps further and cushions your Motors and Productive Machines against the wear, vibration and fatigue that are the source of most machine failures. No other coupling is like the—

Kanti-lever Coupling

It has a circular series of laminated, resilient Cantilevers of 200,000 lb. steel operating in taper-side slots. End thrust is impossible: leverage on the cantilevers decreases automatically with increased load: safety stops prevent damage from extreme overloads: special end-float obtainable up to four inches without increase in cantilever stresses: outer periphery can be used as a brake drum for quick-stopping machinery. Over 3,000,000 H.P. in service. Send for Bulletin No. 28-M.

BROWN
ENGINEERING CO. 120 N. THIRD ST.
READING, PA.



**SLOTS 2 SIZES
AT ONCE**

**SPECIAL PURPOSE
NUT SLOTTER**

- 6 CUTTERS MILLING CONSTANTLY...
- 2 CONVEYORS RUNNING CONTINUOUSLY...
- AUTOMATIC INDEXING...
- AUTOMATIC BURR REMOVAL...
- AS HIGH AS 3000 SLOTTED NUTS PER HOUR... ALL SIZES FROM $\frac{3}{8}$ TO $\frac{15}{16}$ HEXAGON ACROSS FLATS

Used by All
Larger Nut Makers



PELLOW MACHINE CO.
13510 FOLEY AVE., DETROIT 27, MICH.

not required in the holding process should be covered with sheet of paper or pasteboard in order to maintain full strength suction.

"Sur-Lite" Illuminating Grinder Shield

The illustration herewith shows the "Sur-Lite" Illuminating Grinder Shield



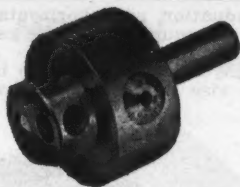
"Sur-Lite" Illuminating Grinder Shield

now being marketed by the Surty Mfg. Co., Inc., Dept. M.M., 4139 W. Kinzie St., Chicago, Ill. Use of the unit is not only said to protect machine operator from flying particles but to provide adequate illumination of the work as well.

Designed for easy installation, the Sur-Lite Illuminating Grinder Shield is equipped with concealed lamps which are said to be of long-lasting quality and to provide illumination that is easy on the eyes.

Flexrock AWOG Floor Resurfacing Material

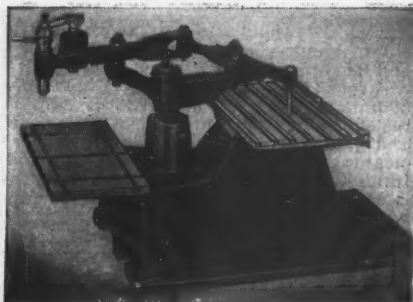
Designated as AWOG, a floor resurfacing material which is especially de-



Micrometer **FRAY** OFFSET BORING HEADS

Offsets $\frac{1}{2}$ "—Head 3" diameter.
Micrometer Dial 50 divisions—.001".
Three Tool Holes—one hole runs true with arbor.
All parts nickel-chromium steel, SAE 3140.
Two $\frac{1}{2}$ " Boring Bars fitted with H.S. Tool.
Bits and Three Wrenches, furnished with each head.

FRAY MACHINE TOOL CO., INC.
503 W. WINDSOR GLENDALE, CALIF.
Manufacturers of "All Angle"
Milling Machines and Attachments



NEW DUPLICATING - PROFILER - ENGRAVER PROFILES + DUPLICATES + ENGRAVES

Easily Operated by Women

Engraves: Iron, Soft Steel, Copper, Brass, Aluminum, Plastics

Larger Engraving Area
Larger Working Area
More Ratios 1:1 to 2:1 by Eighths
Variable Spindle Speeds

Priced from \$225.00—write for details

AUTO-ENGRAVER COMPANY
1776 Broadway, New York, N. Y.

Here's A PRODUCTION TOOL For
50 or 50,000 Pieces!

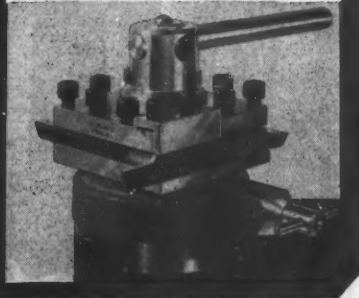
Colwell 4 Tool Post Turret

In all types of machine shops and manufacturing plants, Colwell Turrets have proven their value as production tools, during the past five years. On long or short runs—on simple jobs involving only turning and cutting-off to more complicated work, production has been increased. Positive locking device assures accuracy — cutting-off tool mounted directly in turret without use of toolholder. Good delivery. Send for folder.

S. G. COLWELL

25 CONGRESS AVE. PROVIDENCE, R. I.

**Inexpensive
Accurate Durable**



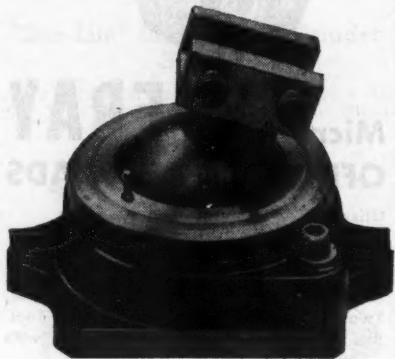
signed for application to floors of machine shops, boiler rooms, refineries, and so on, has been developed by the Flexrock Co., 2315 Manning St., Philadelphia 3, Pa. The material is said to resist the penetration of acid, water, oil, and grease, thus greatly facilitating the cleaning of floors to which it is applied. In addition to its imperviousness, AWOG is said to provide a smooth floor surface which is dustless and durable under the most punishing traffic conditions.

Flexrock AWOG is recommended for use on new floors; for overlays on concrete, brick, stone, or wood floors, and for repairing and resurfacing floor areas of any size.

Strickland Universal Ball Joint Vise

Especially recommended for use in grinding chip breakers, curlers, rake angles, and so on, on all types of cutting tools, the Strickland Universal Ball Joint Vise featured herewith has been placed on the market by the Wall-Colmonoy Corp., 720 Fisher Bldg., Detroit, Mich. By matching ball joint vertical de-

gree graduation with horizontal degree graduation required, the vise can be instantly and accurately set. A single movement of a clamp wrench is said to lock the vise rigidly at the desired set-



Strickland Universal Ball Joint Vise

ting.

The Strickland Universal Ball Joint Vise is adjustable through an arc of 30



STEVENS SCREW HEAD SLOTTER

For Slotting Machine Screws
Up to $\frac{3}{4}$ Inch Body Diameter.

— ALSO MAKERS OF —
Screw Machines
Rotary Tables
Multiple Spindle Centers
Milling Machine Vises

Write for Bulletins

JOHN B. STEVENS INC.
482 CANAL STREET
NEW YORK 13, N. Y.

THE MODERN SURFACE PLATE

OF



MARBLE

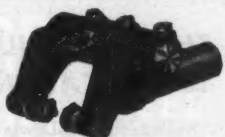
- Does not distort
- Will not rust
- Non-magnetic
- Reasonably priced

Made in all sizes with surface tolerance of
.001" or .0003".

STANDARD MARBLE WORKS INC.
242-246 JAVA ST. BROOKLYN, N. Y.

Established 1901

ADJUSTABLE KNURL HOLDER



MAKES MANY PATTERNS



Using Only Straight Knurls

With shank made to fit any turret, the Graham Knurl Holder handles a wide range of diameters and patterns, with the great advantage of working from the turret instead of the tool slide. Learn its many unusual features.

Request Illustrated Price Circulars

GRAHAM MFG. CO.

34 BRIDGE ST.

EAST GREENWICH, R. I.

Boyar-Schultz COPPERHEAD LAPS

Save Tool Room Time Speed Up Production

Consider the tool room time saved by using Copper Head Laps instead of making laps in your shop. But that is not the only saving. Boyar-Schultz Copper Head Laps do not wear out. The inexpensive copper sleeve is the only wearing part. Adjustment feature permits maintaining the correct lapping size till sleeve is completely worn out and is then replaced with a new sleeve. Available from stock in standard sizes, $\frac{1}{8}$ " to $2\frac{1}{2}$ ".

WRITE FOR PRICES OF LAPS AND
EXTRA SLEEVES.

Write for
Circular
No. PL



Boyar - Schultz Corp.

2120K WALNUT ST.

CHICAGO 12, ILL.

deg. in a horizontal plane and is 4 $\frac{1}{4}$ inches high x 5 $\frac{1}{4}$ inches wide. The unit has a shipping weight of 16 lb. and is supplied complete with adjustable leather dust apron for covering ball and socket.

Dix-Wilder Automatic Collet Closer

Designed to increase lathe production, the Dix-Wilder Automatic Collet Closer



Dix-Wilder Automatic Collet Closer

shown herewith is now being offered by the Dix Mfg. Co., 603 E. 55th St., Los

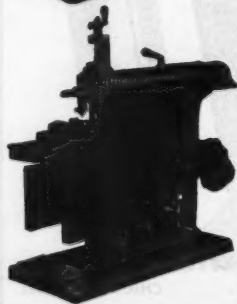
Angeles 11, Cal. The device, according to the manufacturer, is constructed to fit any lathe having a $\frac{3}{4}$ -inch spindle hole, will accommodate 1-A collets, and can be quickly and easily installed. The unit is made of high grade materials and precision machined. All parts subject to wear are hardened to correct degree and ground for long-life performance.

Outstanding features of the Dix-Wilder Automatic Collet Closer include positive locking arrangement; ball bearing adjustment; rustproof finish, and smooth operating construction with minimum number of parts.

McGill Redesigned No. 1010 Levolier Switch

To further conserve critical materials for war production purposes, the McGill Mfg. Co., Inc., Valparaiso, Ind., has again redesigned its No. 1010 Levoller Switch. Recently the switch was redesigned with a plastic casing in place of the former brass shell, which change, it is claimed, released enough brass to produce approximately four million .30 caliber shells per year.

COMPLETE THESE USEFUL TOOLS FROM LEWIS CASTINGS



These two compact, well-designed Lewis Tools are low in cost but *tops* in production when it comes to milling or shaping a wide variety of smaller parts!

Furnished as either plain foundry or semi-machined castings, with all necessary materials and blueprints showing construction details. Semi-finished Mill can be completed in about 40 hours in the average shop... semi-finished 10" Shaper in approximately 75 hours. Only simple lathe, drill press and hand finishing are necessary. Total cost is but a *fraction* the cost of comparable finished tools capable of accurate, fast production.

Deliveries are prompt on priorities of AA-5 or higher. Illustrated catalog fully describes these and 21 other metal and woodworking tools... send for your free copy today—no obligation.

Quotations Gladly Furnished

LEWIS MACHINE TOOL COMPANY

P. O. Box 116, Sta. A, Dept. T-32, Los Angeles 31, California

BAUMBACH



STANDARDIZED

DIE SETS

Machined Steel Semi-Steel

Standardized Die Sets, embodying many exclusive features, a listing of more than 195,000 stock sizes and 46 different styles afford a service that is unsurpassed.

Send for Our New Catalog

E. A. BAUMBACH MFG. CO.
1806 S. Kilbourne Ave. Chicago, Ill.

HURON **ALL STEEL**

GAGE HANDLES

TAPER-LOCK and TRI-LOCK

ALL 10 STANDARD SIZES



The Best Costs You Less!

WRITE FOR LITERATURE • PRICES • DISCOUNTS

HURON MACHINE PRODUCTS
5555 CONNER AVE. • DETROIT, MICH.

**Use Them
Over and Over**



**DE-STA-CO
ARBOR
SPACERS**

Measured by the number of times De-Sta-Co Spacers can be used, they are the lowest in cost of any spacers you can buy.

Made of metal, they are not affected by oil or heat.

Use for quick set-up of milling machine cutters and wherever low cost, accurate spacing is needed. Stock sizes .001" to .125" thick. Specials, any length, cut from bar stock, ground to decimal.

TRIAL ASSORTMENT—enough for average use on one machine sent for \$1.00. Give arbor size.

Size and price list sent **FREE!**

DETROIT STAMPING CO.
Established Over 25 Years
340 Midland Ave. • Detroit, Mich.

Spartan

BAND SAWS

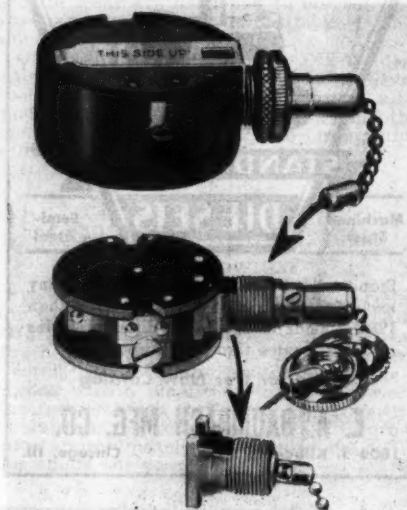
Made for all types of band saw machines — including the contour and die cutting type — manufactured and heat-treated by the latest methods—supplied in coils or welded, as desired—are Spartan Wood and Metal Cutting Band Saws.

Try Spartan Band Saws.
Ask your distributor today.

SPARTAN SAW WORKS, INC.
SPRINGFIELD, MASSACHUSETTS



An additional saving in critical metal is now effected through the use of a plastic material in the fabrication of the frame to which the top and bottom discs of the switch are fastened. This frame, which is pointed out by arrows in the



McGill Redesigned No. 1010 Levelier Switch

accompanying illustration, was formerly made of a very high grade steel. The front portion of the frame is threaded to accommodate mounting nut.

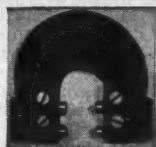
Crobalt Production Calculator

Designated as the Crobalt Production Calculator, an ingenious chart which is designed to simplify calculations for machining operations is now being issued by Crobalt, Inc., 1354 N. Main St., Ann Arbor, Mich. Problems involved in performing turning, drilling, boring, reaming, facing, and milling operations may be readily solved. The charts are assembled into a pad so that after a problem has been solved, the page may be torn out and filed with the blueprints or specifications for the job.

The Crobalt Production Calculator includes a wide range of diameters, r.p.m.'s and so on, which are said to cover the average types of machining operations. Use of the chart is said to enable the

JOHNSON'S

Adjustable Limit SNAP GAGES



MODEL A



MODEL B



MODEL C

Keep down your gage costs by using these fast, accurate gages. Reset when necessary.

Also: Flat and Cylindrical Plug Gages, Built-Up and Solid Snap Gages, Flush Pin and many other types of gages.

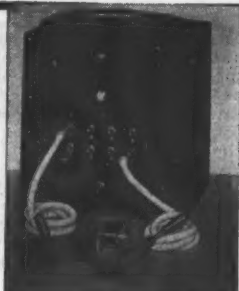
WRITE
FOR
DETAILS.

Factory:
Pequanock, N. J.

W. E. JOHNSON CO.

Turnpike and Pequannock
Pequanock, N. J.

MARK IRON, STEEL and CARBIDES



THE *Etchograph* WAY

Original Electric Etcher. 3000 in Daily Use
Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides — quickly — plainly. • Three sizes to meet all requirements. • Also a combined Etchograph and Demagnetizer.

• Write for circulars and prices.

BREWSTER-SQUIRES CO.

40 CHURCH ST.

NEW YORK

DESIGNED FOR Safety... BUILT FOR Strength



Hollow Set Screw



Hollow Lock Screw

The natural advantages of hollow set screws include safety on revolving or moving parts, ease of assembly in confined places, and more compact construction.

The tremendous holding power of Mac-it Hollow Set Screws makes locking devices unnecessary in all but a few applications. In these cases, Mac-it Hollow Lock Screws are used like jam nuts to prevent any possibility of loosening.



Mac-its
PRONOUNCED
"MACK-IT"

Other Mac-it Products Include
Socket head cap screws, Stripper bolts, Hollow pipe plugs, Hexagon head cap screws, Square head set screws.

Strong, Carlisle & Hammond Company

• **Cleveland, Ohio**

estimator to very accurately predict production in pieces per hour. The calculator, according to the publisher may also be used by the engineering department to arrive at the greatest production or for the visual analysis of an operation that is not being run as efficiently as desired, since it will usually indicate where inefficiency of a tool setup exists. Another use of the chart is for permanently recording the cutting conditions of a job in order to duplicate the setup on the same or a similar run at a later date.

Copies of the Crobalt Production Calculator are available free upon request.

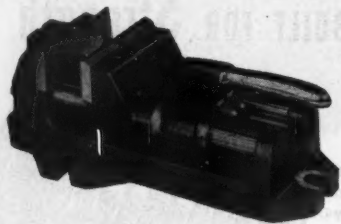
NEW BOOKS

Engineering Mechanics. By Ferdinand L. Singer. Published by Harper & Brothers, 49 E. 33rd St., New York, N. Y. 482 pages. Cloth binding, board covers. Price, \$4.00.

In this book, an attempt has been made to present the fundamental principles of the subject in a form that will transmit these principles easily and completely to the student for his thor-

ough understanding and permanent possession. Wherever possible, equations have been interpreted in terms of their geometrical equivalents; the student is given a picture of what is being discussed. A distinct effort is made to eliminate the memorizing of traditional rules of sign. Thus in dynamics, all rules of sign have been reduced to one common denominator; namely, the initial direction of motion determines the positive sense of forces, moments, displacements, velocities, and accelerations for all motions. Furthermore, the significance of the sign of a quantity is emphasized so that the student can choose for himself whatever system of signs he finds most convenient.

Analytical methods are emphasized throughout the book, yet graphic methods have not been neglected. Graphic methods appear frequently in the portion on dynamics, however, all graphic methods for statics have been grouped together in a unified treatment to form the concluding chapter. This grouping of methods is said to afford an opportunity to coordinate them as well as to enable the student to find quickly the particular method he is seeking. Another unusual arrangement is the relegation of all the material on simple harmonic motion and various types of



How to End Distortion Spoilage . . .

USE A VISE WITH ADJUSTABLE PRESSURE

Injury to parts as a result of faulty clamping in milling and drilling operations can be avoided by using a Presto-Vise instead of an ordinary vise. This is because the jaw pressure of the Presto-Vise can be adjusted according to the softness or hardness of the metal that is being clamped.

The Presto-Vise also speeds up operations tremendously because of its quick action. A single movement of a lever causes the sliding jaw to travel from "closed" to "open," or vice versa. And its large jaw opening ($4\frac{1}{2}$ ") makes it easy to get the parts quickly in and out of the vise.

Widely used in tool rooms as well as for production work. Special attachments make it quickly convertible into an adjustable drill jig.

**Free
CATALOG**

PRESTO-VISE

D. A. SMITH & CO.

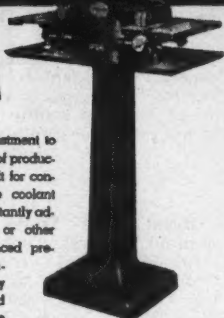
8085 Livernois Detroit, Mich.

The CRITERION Carbide Tool Grinder

**GREATER
PRODUCTION
CAPACITY**

Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third H.P. balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resin bonded diamond wheels.

Order from your dealer or write direct. Request literature. No obligation.



CRITERION
MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

CARROLL AND JAMIESON LATHES 15" AND 16"

12 Speed Geared
Head Motor Drive
Timken Mounted
Spindle.

Modern Design—
Liberal
Dimensions.



Write
for
Bulletin.

**THE CARROLL & JAMIESON
MACHINE TOOL CO.**

SATAVIA OHIO, U.S.A.

Get 'em in a hurry! Johnson Furnaces

**2 WEEKS
DELIVERY**

No. 575

Pot-Hardening
and Melting
Furnace

\$315 F.O.B.

Factory
(Blower
Extra)

- Lid-lifting mechanism easily raises cover. Locks in UP position.
- Heavily insulated — 4½" firebrick, backed up with 3½" insulating block.
- Steel pot is 14" diameter, 20" deep. An efficient, economical furnace, ready for immediate delivery.



Offices in all principal cities.

JOHNSON GAS APPLIANCE CO.
585 E Ave. NW., Cedar Rapids, Iowa.

Please send me Free New Johnson Catalog.

Name.....

Address.....

City..... State.....

pendulums to the chapter on mechanical vibrations.

Among other things, special attention is directed to the following topics which are discussed in a very simple manner: force systems in space; Mohr's circle to determine maximum and minimum moments of inertia; velocities and accelerations in plane motion; dynamic equilibrium, especially when applied to complex problems in plane motion; work-energy and impulse-momentum methods, particularly the concepts of these terms.

Also of importance is the summary appended to each chapter. These summaries are intended to give the student a coordinated picture of what he has studied, and should be helpful in review and post-college work.

Numerous illustrative problems are carefully explained to show the application of the theory. The explanations are complete—nothing is taken for granted. A consistent plan that may be called the "Theory-Solution" method is followed for all illustrative problems. With this technique, the equation or theory to be applied is stated at the left-hand side of the page. Numerical values are then substituted therein in the respective order in which the symbols appear in the equation. This procedure enables

the student to readily follow the various part of the solution without continually referring to the body of the text. In addition, many supplementary explanations are given on the use of the equations—way they were selected and what method to apply to the particular problem.

Problems for assignment have been carefully chosen to represent a wide variety of types. An effort has been made to avoid undue repetition of types, although some duplication exists.

Metals and Alloys Data Book. By Samuel L. Hoyt, Technical Adviser, Battelle Memorial Institute, Columbus, Ohio. Published by Reinhold Publishing Corporation, 330 West 42nd Street, New York, N. Y. 334 pages, 6 $\frac{1}{4}$ x 10 inches. 61 illustrations; 340 tables. Cloth board binding. Price \$4.75.

This book is the direct outgrowth of an attempt by the author to satisfy his own need for reliable data on metals, and it will be found that in this book the large field of metals and alloys is covered in considerable detail in a relatively small space.

Automatic Metal Saw Grinder and Retooler

MODEL IC

PRECISION
and
ACCURACY
AUTOMATICALLY
ASSURED



For metal cutting
saws 2" to 14" in dia.
When specified, saws
as small as $\frac{1}{2}$ " dia.
and $\frac{1}{4}$ " to 2" spacing.
Also supplied as
a Combination Grinder
for circular, band
and hack saws.

WRITE FOR CIRCULAR

The Wardwell Mfg. Co.
3166 Fulton Rd. Cleveland, Ohio

NEAT STAMPING

in
NAME
PLATES



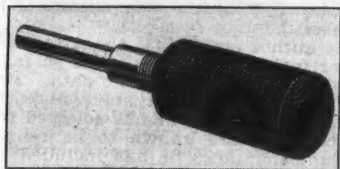
Nameplate Detail Press

This machine quickly stamps details
and serial numbers into name plates.

Write for Particulars

GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave. Chicago, Ill.

NEW FLEXIBLE ABRASIVE WHEEL

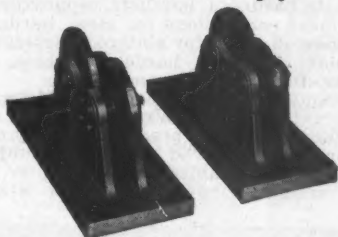


Designed for precision work. Used for removing burrs, fins, tool marks on various types of production work. A very indispensable aid in speeding up production.

Write for catalog and free sample.

Field Abrasive Specialty Mfg. Co.
201 Lowe Bldg. Dayton, Ohio

ANDERSON BALANCING WAYS *Pillow Block Type*



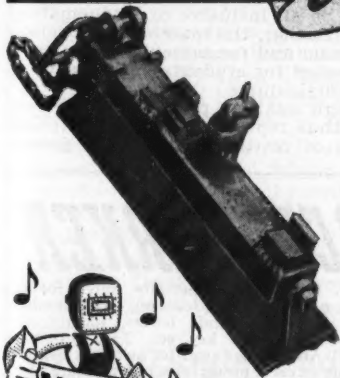
A sub base can be made of proper height to give necessary clearance for large diameter work. Supersensitive ball bearings and hardened and ground spindles assure accuracy.

Write for details.

ANDERSON BROS. MFG. CO.
1926 KISHWAUKEE ST. ROCKFORD, ILL.

JIGS

in jig time



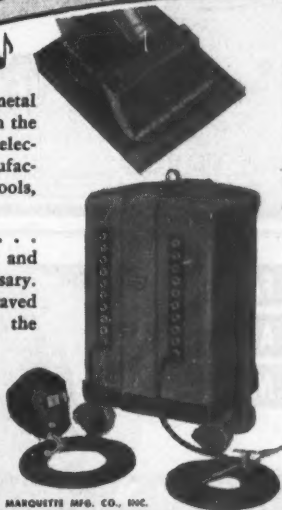
No other method of metal fabrication can approach the speed and economy of electric welding in the manufacture of all sorts of tools, dies, jigs and fixtures.

Sensitive layout work . . . costly drilling, tapping and dowelling are unnecessary. Critical tool steel is saved by hard-surfacing only the cutting edges.

Send for free,
24 page,
illustrated
booklet.



MARQUETTE
REGISTERED U.S. PAT. OFFICE
A.C. ARC WELDERS



MARQUETTE MFG. CO., INC.
Minneapolis, Minnesota

The subject matter has been reduced, practically in its entirety, to tables which are intended to give the reader the maximum of information in a minimum of space. The first chapter deals with test specimens. The second chapter includes a discussion of the various kinds of hardness tests, with tables of Brinell hardness numbers, approximate hardness conversions for steel, hardness conversion table for sintered carbides, a similar table for hardened steels, for brass, for die steels, and so on.

Chapter III, which contains 131 pages, is devoted to the Wrought Steels and contains tables for practically every consideration involved in this subject. There are 172 tables in this chapter.

Chapter IV covers the Cast Steels;

Chapter V, Stainless Steels; Chapter VI, the Cast Irons; Chapter VII, Heat- and Corrosion-Resistant Casting Alloys; Chapter VIII, the Non-Ferrous Alloys; Chapter IX, Additional Metals, and Chapter X, 18 pages of General Data, including Wire and Sheet Metal Gauge tables, Weights of Sheets and Plates table, Temperature Conversion tables, and so on. Included in the general data are shown 26 grain size charts (X100) for classification of steels.

The author states that the data selected for inclusion represents, in so far as he is able to judge, "good" data. Much of it he has checked against more than one reliable source, or has selected from sources that are known to be reliable. In some instances he has included several sources.

It is the opinion of this reviewer that this book fills a very definite need and that it will be invaluable to everyone concerned with the working and heat treating of metals.

Shop Mathematics. By Arthur A. Dick. Published by The Ronald Press Co., 15 E. 26th St., New York, N. Y. 230 pages. Cloth binding, board covers. Price, \$2.40.

This book is the result of the author's experience in organizing courses of instruction and teaching related mathematics for industrial subjects. Its contents are planned for shop mathematics courses and vocational subjects of high school equivalence. It is not their purpose to be all inclusive of mathematical topics. Rather, the materials are selected as basic and fundamental units especially suited for students pursuing vocational curriculums.

Through analysis procedures, the content is thus representative of the fundamentals of arithmetic, algebra, geomet-

DO YOU KNOW THAT "CHAMPION" DIAMONDS ENABLE YOU TO DO FASTER AND MORE ACCURATE TRUING AND DRESSING OF GRINDING WHEELS ?

Every month more and more Champion diamond tools are being used for exacting fast work on grinding wheels.

Feel free to write us for full information regarding this trend...and how Champion diamonds can fit into YOUR picture.

Send for our new Fielder Catalogue

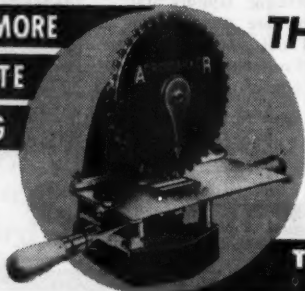
CHAMPION

DIAMOND COMPANY - NEW YORK

12 YEARS EXPERIENCE INDUSTRIAL GRINDING AND SHARPENING EQUIPMENT

**FASTER, MORE
ACCURATE
MARKING**

Write for
Descriptive
Literature.



THE ACROMARKER

The No. 1 Model is especially suited for fast marking, numbering and lettering serial numbers, voltage indications, code letters, identification marks, manufacturers' key, etc. Easy to operate, the No. 1 Acromarker requires merely a swing of the handle to exert powerful screw pressure of the dies on the parts to be marked. Dies are automatically advanced for character spacing, and are replaceable.

THE ACROMARK COMPANY

9 MONMOUTH STREET ELIZABETH, NEW JERSEY

**SERVES AS A READY-MADE
JIG OR FIXTURE**



6", 9" & 12"
JAWS

Sold
plain
or with
jig
attach-
ments

GRAHAM MULTI-PURPOSE VISE

Drilled to receive a wide variety of readily interchangeable jaws, stops, guides, etc., this vise saves much toolmaking which would otherwise be needed for making the equivalent jigs and fixtures. Sizes for drill press, radial, miller, planer, shaper, grinder.

Request Illustrated Price Circulars

GRAHAM MFG. CO.

34 BRIDGE ST. EAST GREENWICH, R. I.

PROMPT DELIVERY

**PRECISION GROUND
THREAD PLUG & RING GAUGES**

American Nat'l Coarse Threads
American Nat'l Fine Threads
American Nat'l Special Threads
In Accordance to A.G.D.

Single End—Double End Plugs
—Combination of a thread
plug and plain core plug for
minor diameters.

Split Adjustable or Solid
Ring Gauges.

(Catalogues Not Available)

Sizes of
plugs up to
10" dia.

Sizes of
rings
from $\frac{1}{8}$ "
to 8" I.D.



ALLEN GAUGE & TOOL COMPANY

Dept. C,

421 N. Braddock Ave. (21), Pittsburgh, Pa.

Easy Way to Correct
SPINDLE MISALIGNMENT

Faulty set-up for tapping and reaming, resulting in oversize or bell-mouthed holes, can now be easily corrected simply by using a Ziegler Floating Tool Holder—a special type of holder that automatically compensates for spindle misalignment of approximately $1/32$ ".

Always floats freely, without friction or cramping, even under the severest tool-driving strains, and takes any and all end-thrusts. Makes it possible to turn out work to the finest of tolerances in spite of inaccuracies in spindle alignment.

In nation-wide use by leading manufacturers in the war industry. Try it out and see how much better tapping and reaming your machines will perform.

W. M. Ziegler Tool Co.

WRITE FOR
CATALOG

1924 TWELFTH ST.
DETROIT, MICH.

Ziegler
ROLLER
DRIVE

FLOATING HOLDER
for Taps and Reamers...



Prompt Delivery on DORMAN TAPPERS



Adjustable Friction Drive No. 1 Tapper drives smallest tap in softest material to $\frac{1}{8}$ " tap in steel.

No. 2 Tapper Drives from $\frac{1}{8}$ " to $\frac{1}{4}$ ".

No. 3 Tapper Drives from $\frac{1}{4}$ " to 1" in steel or other material.

Simple adjustment changes from light

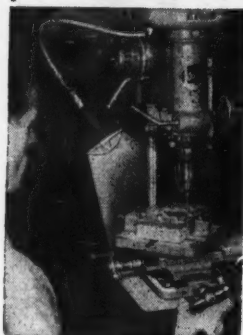
friction to positive drive or any intermediate stage on No. 1 size.

WRITE FOR DETAILS

DORMAN MACHINE TOOL WORKS

357 CANAL ST. • NEW YORK 13, N. Y.

The LIGHT That "Gets Around The Corners"



Fluorescent lighting with all its advantages doesn't always provide the close-up, exactly focused illumination so often needed for precision work. VIMCOLIGHT directs a concentration of light . . . glareless, clear, restful . . . where the operator needs it for fast,

error-proof production. Write for circular.

VIMCO MANUFACTURING CO.
111 CHENANGO ST. BUFFALO 13, N. Y.

VIMCOLIGHT

try, and trigonometry which the average vocational student should master as being applicable to the machine shop, the sheet metal shop, aircraft subjects, and others.

A distinctive feature of the book is its organization of the materials into teaching units and assignments. The teaching units have been arranged in a definite sequential order. Each unit does not necessarily constitute a teaching lesson, although in practice, an average of one unit and one assignment per teaching period has been found to be effective and good teaching procedure. The basic fundamentals presented in the first several units are very important, and it is necessary for the student to master these fundamentals of arithmetic, as they are the "working tools" of all the succeeding teaching units.

The materials of instruction are associated throughout the book with numerous figures, diagrams, and working drawings. Use of the concept of schedules and table relationships, as used in industry, is stressed. Algebraic forms of simple equations are presented, since they serve as the basis for the solution of all formulas. In addition, a number of practical test applications is provided.

What's Your Problem IN SPEED REDUCTION

There are reasons why Abart means more efficient reducers throughout industry. These reasons should be of help to you.

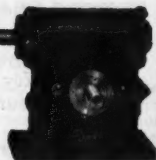
ABART SPEED REDUCERS

Worm and spur of every type, 1/50 to 400 h.p.

Send for Complete Catalog.

Wire or write.

ABART GEARS cut to specifications. No stocks. Let us estimate.



1/50 to $\frac{1}{2}$ h.p.

Abart

GEAR AND MACHINE CO.
MANUFACTURERS OF
Speed Reducers & Gears
401 W. 10TH ST. CHICAGO, ILL. 10

ACCURATE SPACING...

assured on all indexed work on a Universal Milling Machine. Straight, spiral or tapered. No binding, cramping or lost motion.



No. 130

RED-E Compensating
Milling Machine Dog
CATALOG 43

**THE READY
TOOL CO.**

510 Ironston
Ave.
Bridgeport
Conn.

SLITTING SAWS



STANDARDS FROM STOCK

PRECISE RUGGEDNESS characterizes these superior saws through the exclusive use of the "Perfexite" process of heat treatment.

• • • • •

We also manufacture

**TOOL BITS
KEY SEAT CUTTERS
CENTER DRILLS
LATHE MANDRELS**

• • • • •

Write for New Catalog.

True-Cut
TOOL COMPANY

14238 BIRWOOD, DETROIT 4, MICH
(Copyright '43, H.)

DIAMOND

Superset
WHEEL DRESSER

These dressers, hard diamond wheels, are a long life alloy cutting tool. ECONOMICAL—All diamond dressers are available in a variety of sizes and shapes. EFFICIENT—Superset cutting wheels are used with wheel at all times.

METAL CARBIDES CORPORATION
YOUNGSTOWN, OHIO



PRECISION

DIE MAKING MACHINES

Two companion machines that far outrange in versatility and ease of operation any combination unit. The Grob Band Saw and the Grob Filer embody exclusive principles of design and construction not found in any other single machine. Write us for details which prove their place in your plant.

GROB BROTHERS
GRAFTON, WISCONSIN

LATHE PANS

Precision Lathe Pans, any size, any shape, to fit present Lathes or new designed Lathes. 62 years fabricating plate and sheet steel is your assurance of quality work. Send blueprints for prices.





LITTLEFORD

LITTLEFORD BROS., INC.
433 E. Pearl St., Cincinnati, O.

SHOP LITERATURE

Mahr Muffle Type Gas Fired Tool Furnace is described and illustrated in a four-page bulletin released by Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minn. Complete procedure for using this furnace for hardening high speed steel tools is given on Page 3. Use of the furnace in the copper and silver brazing of carbide tool tips without flux is explained on Page 4. Copy of Equipment Bulletin No. 290 free upon request.

Mead Industrial Air Power Catalog. Mead Specialties Co., 15 S. Market St., Dept. 73-AA, Chicago 6, Ill., is now distributing a 28-page catalog presenting its line of air-operated devices. The catalog includes illustrations, descriptions, and specifications of air clamps of various types, work feeders, air vises, air presses, foot controls, valves, and other devices. Photographs show applications of the various devices and drawings give dimensions. Copy of catalog free upon request.

IF YOUR WORK REQUIRES THE FINEST IN
ACCURACY AND WORKMANSHIP,
SPECIFY --



SWANSON

SURFACE PLATE

MORE SWANSON, LESS MONEY
LESS COST

Made in
24 Different Sizes
Up To 36" x 60"

Swanson Tool & Machine Corporation

810 East 8th St., Erie, Pa.

THE MARK OF QUALITY

SWANSON

TOOL AND MACHINE CORPORATION ERIE PA.

SINCE 1919

Greenfield No. 4

PLAIN TOOL
AND
CUTTER GRINDER



The No. 4 can handle the greater majority of grinding operations.

This machine can also be supplied as a Universal Grinder for cylindrical and internal grinding. It will grind cutters on centers, $6\frac{1}{4}$ " diameter... on holder, 14" diameter.

•
**SEND FOR
COMPLETE
DETAILS**
•

Production Machine Co.

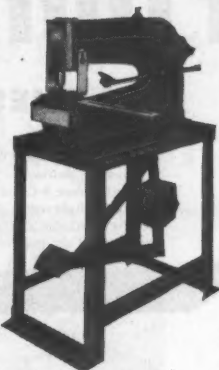
GREENFIELD

MASSACHUSETTS

POLISHING MACHINES • SENSITIVE DRILLS

WHITNEY-JENSEN PRODUCTS
30 YEARS EXPERIENCE

**TOGGLE
ACTION
FOOT
PRESSES**



These machines have a powerful linkage that MULTIPLIES foot power to provide fast, EASY action on punching and forming operations, and light production work. Capacity 2" hole in 16 ga. iron. Available in four sizes, 7", 10", 18", or 24" throat depth.

WHITNEY METAL TOOL COMPANY

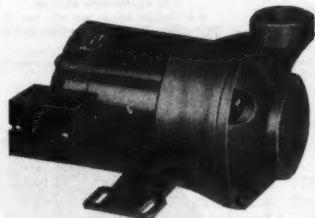
110 FORBES ST.

ROCKFORD, ILL.

Penrod

Centrifugal Coolant Pumps

**MODEL P-10H PUMPS ARE EASILY APPLIED
PENROD PUMPS GIVE BETTER SERVICE**



MODEL P-10H

Model P-10H pumps use the motor feet for mounting and can be located in any position as long as the liquid will flow into the pump by gravity. This pump is easily installed on old or new machines and is ample enough to handle single or multiple installations. Model P-10H- $\frac{1}{2}$ will pump up to 1200 G. P. H., and Model P-10H- $\frac{1}{4}$ up to 2400 G. P. H. Penrod pumps are conventional in style, but we have incorporated many new features such as replaceable seal assemblies, totally enclosed motors, grease sealed ball bearings, streamlined design, etc.

Some jobber districts
still open

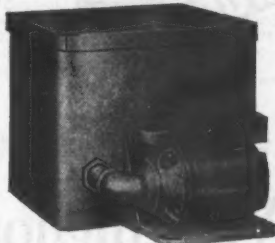
Tank built especially for Model P-10H- $\frac{1}{2}$. Pump can be supplied promptly. Made from heavy sheet steel and containing built-in baffle to collect chips. Lid can be removed to clean tank without disconnecting return pipe fittings. Model P-10H pumps are ready for immediate delivery. Phone or wire us for details.

Manufacturers of Machine Tool Coolant Pumps for years

**FLOYD PENROD & SONS
TOOL & ENGINEERING COMPANY**

1208-1216 W. 2nd Street

MUNCIE, INDIANA



Prompt Delivery!

ON THESE WESTINGHOUSE WELDERS

Need a-c or d-c arc welding machines? Westinghouse offers any of the models shown on this page for *immediate delivery*.

Westinghouse A-C Arc Welders boost welding speeds from 15 to 30 per cent . . . because arc blow is eliminated; heavier electrodes can be used; no "time-outs" for maintenance are necessary.

Westinghouse D-C Flexarc Welders, with new Arcontrol, are the favorite of welding engineers and operators everywhere. Just one simple adjustment gives the welding current desired . . . and Arcontrol offers choice of three types of arc.

For quick delivery or more information, call your Westinghouse distributor or Westinghouse office.

1-90477-A



FOR HEAVY-DUTY, PRODUCTION WELDING
A-C Welder Model WC-3C—500 amperes. Infinite number of current settings from 100 to 625 amperes.



FOR HEAVIER THAN AVERAGE WORK
A-C Welder Model WC-2C—300 amperes. Infinite number of current settings from 60 to 375 amperes.



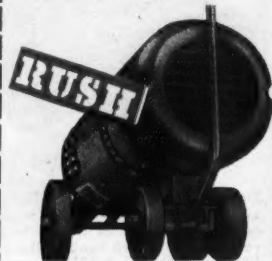
FOR ALL-PURPOSE WELDING
A-C Welder Model WT-4C—200 amperes. Has 27 different current settings from 20 to 250 amperes.



FOR MAINTENANCE AND LIGHT WORK
A-C Welder Model WT-1C—100 amperes. Has 15 current settings from 20 to 140 amperes.



FOR UNIONMELT* WELDING
Westinghouse A-C Welders for use with the Unionmelt Process available in 500, 750, 1,000 and 1,500-ampere models.



300-AMPERE FLEXARC D-C WELDER
New single preset current adjustment plus ARCONTROL. No exciter, rheostat or reactors to fiddle with.

Westinghouse WELDERS

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

*Registered trade-mark of The Linde Air Products Co.



"Safety Marking Tools," a four-page folder now being distributed by the M. E. Cunningham Co., 158 E. Carson St., Pittsburgh, Pa., illustrates and describes the line of marking devices manufactured by this firm. Treated in the folder are hand-operated marking machines, various types of holders, stamps, inspection hammers, roll dies, type, and so on. Copy of folder free upon request.

"On Guard!" Since a considerable portion of the increase in cutting tool breakage is due to failure of inexperienced operators to watch their machines and tools while cutting, a recent tool conservation poster issued by the Genesee Tool Co., Fenton, Mich is designed to impress on workers the effect of this form of carelessness.

The poster shows a close-up of two soldiers "on guard" with a machine gun against enemies in the field. Below this is an illustration of a lathe on which the chuck has become loosened and the tool and work are being wrecked while the operator has his back turned. Below the word "On Guard . . . Are You?" is a repetition of the key to the poster series — "Carelessness Breaks Valuable Tools! There Is Only So Much Tool Steel Available!" Copy of the poster is available to industrial plants free upon request.

Jansson Handbook of Precision Measurement. To help train inspectors and machinists in the use of gage blocks and vernier instruments, the Jansson Gage Co., 19214 Glendale Ave., Detroit, Mich., has issued a 64-page, generously illustrated volume entitled "Handbook of Precision Measurement."

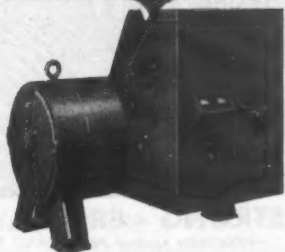
The instruction section of the handbook comprises five chapters devoted to the history of measurement, precision measurement, the making of gage block combinations, gage block inspection, angle measurement with the sine bar, and the use and reading of vernier calipers and height gages. Photographs of actual operations supplement the text, which is in simple nontechnical language. Following the instruction section is a catalog of the extensive Jansson line of gage blocks, vernier height gages, and vernier calipers.

Ordinarily offered at a price of 50 cents, copy of the handbook is available free of charge to executives requesting it on their company letterhead.

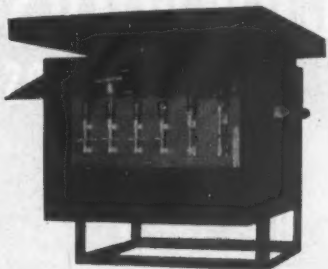
MULTIPLE OPERATOR SET

DOES THE WORK OF

20 TO 30
SINGLE OPERATOR SETS



For continuous-duty, mass production welding where a large number of operators can work in a small area, specify Westinghouse Constant-Potential Multiple-Operator Sets.



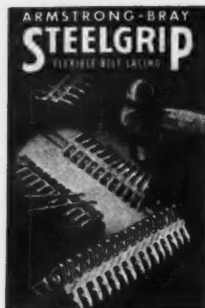
Operator control panels are available in single and two-operator types. Current range is 150, 200, 250 and 300 amperes. For latest literature, write to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

1-90477-A

Westinghouse
WELDERS



PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE



STEELGRIP BELT LACING

A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, prevents fraying. 2-piece hinged rocker pins provided. 8 sizes. In boxes, handy packages, cartons and long lengths.

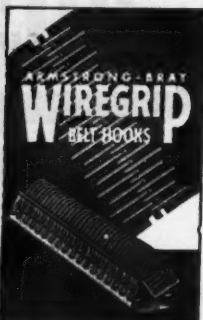
Write for catalog sheets.

ARMSTRONG - BRAY & CO.

"The Belt Lacing People"
5346 Northwest Highway Chicago, U. S. A.

BELT LACING Both types from 1 source

BELT HOOKS come with blue aligning cards that prevent waste—every hook can be used. Protects fingers. Applied with a WIREGRIP or any other standard Belt Lacing Machine. 6 sizes.



Bakewell No. 0 Tapping Machine with capacities of No. 0-80 to 8-32 in steels is the subject of a 12-page profusely-illustrated catalog released by the Bakewell Mfg. Co., 2023 Santa Fe Ave., Los Angeles, Cal. Features, specifications, uses, and operation of this bench type precision tapping unit are fully covered in the catalog, copy of which is available free upon request.

Carboly Bulletin GT-157. A six-page bulletin on procedures to be followed in reclaiming carbide-tipped cutters and worn out high speed steel cutters has been issued by the Carboly Co., Inc., 11143 E. 8 Mile Ave., Detroit 32, Mich. Included in the bulletin is detailed information on how to utilize carbide tips which have been broken or worn under-size; how to remove carbide tips from steel shanks, both silver and copper soldered; how to reclaim worn out high speed steel cutters by brazing carbide tips on the cutting edges; the brazing of carbide tips to shanks; how to make sandwich brazes; and how to braze tips to multiple point cutters. Copy of Bulletin GT-157 free upon request.

GAMMONS

REAMERS

Manufacturers of
The Gammons Helical Tap & Reamer
The Gammons Helical Chucking Reamer
The Gammons Helical Die Making Reamer
The Gammons Helical Tap & Reamer
Special reaming problems solved

THE GAMMONS-HOAGLUND CO.
MANCHESTER CONNECTICUT

HARGRAVE

the right CLAMP
for every job



War plants are taking practically our entire output of clamps — and gaining increased efficiency and improved results.

These heavy demands make it difficult to fill all orders. See your supplier—he'll do his best to help.

Stock sizes range from $\frac{1}{4}$ " to 10" openings, from $\frac{1}{2}$ " to 16" deep. A complete line in all patterns and sizes.



The CINCINNATI TOOL Co.

Est. 1879

1947 WAVERLY AVE. CINCINNATI, OHIO

LUMA

Patented



Combination Demagnetizer and Electric Etching Pencil. Marks symbols in hardest steel. Demagnetizes instantly. One of our models popular in tool rooms for 15 years.

Luma Electric Equipment Co.
DEPT. MS TOLEDO 1, OHIO

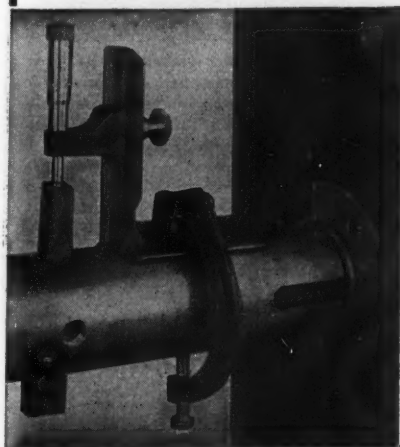
✓ Send For This Bulletin
on **ERICKSON**
Precision
COLLET CHUCKS



ERICKSON STEEL CO.
2309 HAMILTON AVE. CLEVELAND, OHIO

BARTELT PEDESTAL MICROMETERS

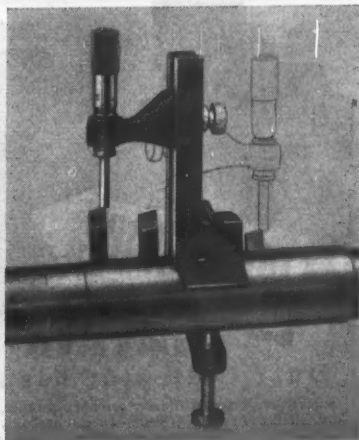
formerly called Bartelt Tool Setting Gage



MODEL
"A"

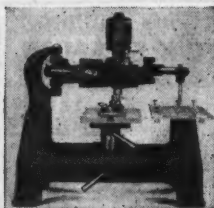


MODEL
"B"



★ These handy, practical gages will speed up boring work and help to produce accurate results more easily. Green hands are aided toward becoming good workmen more quickly. Available in two models, as shown. Three clamps furnished, to fit all boring bars from 1" to 5" dia.

BARTELT ENGINEERING COMPANY
1216 PARTRIDGE AVE. BELOIT, WIS.



**Pantographic
ENGRAVING...
ETCHING...
MARKING...**

Do all three with one machine...the PANTO

A COMPACT precision bench-type pantographic machine, with interchangeable heads...for engraving instrument dials, name plates, etc. . . and for acid etching or electrically marking tools and parts—heat-treated or annealed—on flat, concave, or convex surfaces.

> Write for literature

H. P. PREIS ENGRAVING MACHINE CO.
149A SUMMIT ST. NEWARK, NEW JERSEY



DUSTKOP Dust Collector has it.

Quickly, easily moved from one grinder to another, even the installation of DUSTKOP requires no costly duct work. Ideal for collecting dust from tool, surface, cutter and internal grinders, DUSTKOP is operated by G.E. (or equal) continuous duty motor. Dust laden air is driven up from fan and sent through the efficient cyclone separator. Prompt deliveries on high priorities.



Aget-Detroit Co.

2046 Cook Bldg. CADILLAC 3090 Detroit 26, Mich.

Diamond Dust. A four-page folder now being issued by J. K. Smit & Sons, Inc., 157 Chambers St., New York, N. Y., contains illustrated and descriptive information on the properties of diamond dust which adapt it to the cutting and lapping of various types of tools and dies, and so on. Copy free upon receipt of a request addressed on a company letterhead.

"Campbell Abrasive Cutting Tip Sheet" is the title given to a series of folders now being published at regular intervals by the Andrew C. Campbell Division, American Chain & Cable Co., Inc., Bridgeport, Conn. These folders are designed to show various models of Campbell Abrasive Cutting Machines and to give explanations of how and where these machines fit into the abrasive cutting picture. In addition, the folders include answers to specific questions regarding abrasive cutting sent in by readers.

Campbell Abrasive Cutting Tip Sheets are issued at monthly intervals and free copies can be obtained by writing to the publisher at the above address.

Gear Specialties

SPURS — HELICALS (14 to 96 D.P.)

BEVELS — (straight and spiral)

WORM GEARING — THREAD GRINDING

This range logically embraces the gear components of many critical control devices essential to the war effort and this organization is proud of its contributions of such material in the program.

With full production capacity scheduled far into the future, all new inquiries are now necessarily subordinated to these vitally important prior commitments. However, every urgent need will be given careful consideration.

Gear Specialties

MANUFACTURERS
CHICAGO

SAFE



DAYTON SAFETY LADDERS

have every advantage

No extra man needed to steady—Roomy platform for men and tools. Great strength, lightweight. Guard rails on platform—Automatic locking. Folds compactly

Aluminum spruce is used throughout. Steel braces. Safety shoes. Sizes 3' to 16' in height—Elevating platform adds extra height to Dayton Ladders. Write today for prices, catalog.

DAYTON SAFETY LADDER

121 - 23 THIRD ST. CINCINNATI OHIO



ARMSTRONG-BRAY
Gear & Wheel Pullers

Essential Tools Today--Prompt Delivery because they save hours of time, prevent costly breakage and long shut downs.

STEELGRIP Standard Rigid Arm Gear and Wheel Pullers are of improved design. Will not slip from work. Arms are forged and heat-treated. 2-arm, 3-arm and special models. 12 types and sizes.

CHAINGRIP Universal Pullers pull wheels, solid gears, pinions, etc., even at considerable distance from end of shaft. Proof-tested chains have both chain hooks and special pulley hooks. 3-ton and 12-ton capacities.

Write for Catalog Sheets.

ARMSTRONG-BRAY & CO.

"The Belt Lacing People"
5346 Northwest Highway Chicago, U.S.A.

"Accuracy with promptness"

W. S. **DE MOSS** AND SON

**DIES
★
FIXTURES
★
GAGES
★
TOOLS**

PRACTICAL DESIGN
PRECISION WORK
PROMPT DELIVERY

DIES
DeMOSS — recognized specialists in the design and construction of DIES.

At Your Service!!

660 VIRGINIA AVE.
INDIANAPOLIS

INDIANA

CUT SET-UP TIME IN HALF with F & H UNIVERSAL VISE!



**Just dial
the angle.**

For grinding compound angles as easily and quickly as simple angles. Suitable for drilling, light milling and other machining operations as well as for layout work.

Available with grinding wheel angle attachment.

Vise may be had with 2", 4" or 6" jaws.
IMMEDIATE DELIVERY

For Clamping Odd-Shaped Pieces

F & H Equihold for instant clamping of work pieces with unparallel planes. Consists of two friction plates jointed together by ball and spring socket.

Write for complete information to:

F & H MANUFACTURING CO.
10338 Gratiot Ave. Detroit 13, Mich.



**STANDARD
D-4
Abrasive
Band Grinder**

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre... at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4 x 36 1/4" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW
BOOKLET ON FINISHING—WRITE TODAY

WALLS SALES CORP.
96 Warren St., New York, N. Y.

"Zinc in War." Published by The New Jersey Zinc Co., 160 Front St., New York 7, N. Y., this latest issue of "Zinc in War"—a four-page folder devoted to the Victory program—shows where and how zinc products of the company serve the war effort after they leave the plant. Copy free upon request.

"Precision 'Wet Belt' Machining" is the subject of a 32-page booklet announced by the Porter-Cable Machine Co., 300-7 Wolf St., Syracuse, N. Y. The booklet, fully illustrates and describes Porter-Cable "Wet Belt" Surfacers together with the advantages afforded through the use of these machines in performing precision machining operations on a wide variety of materials on the production line, in toolrooms, assembling departments, pattern, sheet metal, jobbing, maintenance, and repair shops, and so on. The booklet also describes and illustrates dry belt surfacers, disc grinders, oscillating spindle sanders, universal milling machine attachments, shapers, portable electric surfacers and saws, and other Porter-Cable equipment. Copy free.

General Electric Arc-Welding Accessories. A complete line of arc-welding accessories for both men and women operators is presented in a 36-page bulletin issued by the Welding Division of General Electric Co., Schenectady, N. Y. With a cover showing both Joe and Josephine Magee—General Electric's well-known little co-workers who symbolize America's mighty army of men and women welders—the bulletin comprehensively describes all standard as well as many new G-E arc-welding accessories now available.

Prominently featured in this well-illustrated bulletin in chrome-leather, asbestos, and flameproofed-duck protective clothing for both men and women welders, ranging from gloves and sleevelets to complete ensembles. Other items illustrated and described in the bulletin include ventilated helmets and head protectors, observation shields, electrode holders, and various kinds of miscellaneous welding equipment, such as slag chippers, electrode carriers, and fillet-weld gages. Also listed are standard sets of welding accessories together with renewal parts for these accessories. Copy of Bulletin GEA-2704C free to executives upon request.

New
Zinc
I to
and
serve
ant.

' is
an-
nine
Y.
de-
Sur-
af-
ma-
hin-
of
ool-
ern,
and
sklet
belt
pin-
nine
tric
ter-

so-
ing
op-
stin-
en-
Y.
and
ic's
rm-
nen-
om-
as
ac-

us-
es-
ive
ld-
ets
il-
tin
ro-
de
el-
ag
et-
ard
ith
es.
ex-

ROTARY FILES



HAND CUT

CUT TIME ALL SHAPES Cuts & Sizes


Write for Catalog

MECHANICAL DIE & TOOL CO. Inc.
11 New York Ave. Brooklyn, N. Y.

Why Use A Shaper to cut Keyways when a

DAVIS KEYSEATER

will do the job so much quicker and better?



Send for Circular

DAVIS KEYSEATER CO.
Exchange and Glasgow Sts.
ROCHESTER, N. Y.

SAVE SKILLED LABOR AND PRECIOUS TIME WITH THIS HIGHLY EFFICIENT DRILL GRINDER

BLACK DIAMOND

FOR SMALL GAUGE AND FRACTIONAL DRILLS

Hundreds of War Production plants are saving valuable time and skilled labor costs by using Black Diamond Grinders for sharpening small gauge and fractional drills.

A few minutes instruction makes the most unskilled operator an expert on producing quantities of perfectly sharpened drills with lips of uniform length, correct angle and clearance. To speed war production and save expensive drill stock—to reduce drill breakage and release skilled labor for more important work, install a Bench or Pedestal type Black Diamond Drill Grinder at once. Such an investment literally pays for itself in savings in very short time.

The Diamond Dresser keeps the grinding wheel sharp cutting and the Web Thinning Attachment efficiently cares for the grinding of Notched, Colton or Crank shaft points.

Write at once for complete details.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
45 NORTH AVENUE NATICK, MASSACHUSETTS

"Hand Stoned Cutting Tools for Faster, Better, More Cuts" is the title of a 16-page booklet released by Behr-Manning, Troy, N. Y., describing and illustrating Behr-Manning India and Hard Arkansas Oilstones and their use in sharpening cutting tools. Copy free upon request.

"Morale Series." Of interest to executives of war production industries faced with the problem of how to increase the consciousness of employees of their role in the war effort is a series of three studies made by the Metropolitan Life Insurance Company on the subject of employee morale. The series treats the subject from three angles as implied in the titles of the studies; "Planning and Organizing a Morale Program," "Stimulating and Maintaining Employee Morale," and "Reducing Absenteeism Through Employee Education."

"Planning and Organizing a Morale Program" shows the behind-the-scenes work that is essential before an effective morale program can begin to operate with employees. It includes examples of the planning and organization

procedures of many well-known companies which have successfully launched morale programs that have been carefully planned to the last detail. Of special interest in this study are the presentation of the committee system of organization and functions of the publicity department.

The second of these studies, "Stimulating and Maintaining Employee Morale," brings together the practices followed in some 45 well-known industrial companies for introducing and keeping alive the feeling of responsibility and "war consciousness" among the employees. It reports on the effectiveness of slogans, departmental campaigns, awards, publicity, recreation, exhibitions, and other stimuli as used successfully in these companies.

"Reducing Absenteeism Through Employee Education" undertakes to show how companies wage an unrelenting fight against preventable absence from the job. It reproduces the hard-hitting publicity that has been so successfully used in making absenteeism unpopular in the plant and office, and demonstrates by illustration the good work that can be done in combatting this evil through the media of the annual report to employees, the employee magazine, the war



GRAND QUICKCET

SETTING THE PACE ON EVERY PRODUCTION FRONT
 Saving 90% of clamping time—new designs for high speed production work, one hand operation. Non-creep replaceable grips, proof-tested alloy steel construction of forged clamp capacity. Screws, rods and handles copper plated against welding spatter.

A complete line of modern time-saving clamps—both malleable iron and alloy steel:
 Dual Grip "C" Clamps;
 Heavy Duty Speed Clamps;
 Standard DeLux; Standard Alloy-Steel; and Quick Locket, the last word in modern clamp design.

Write today for circular







GRAND SPECIALTIES CO.
 3132 W. Grand Ave. Chicago, Ill.

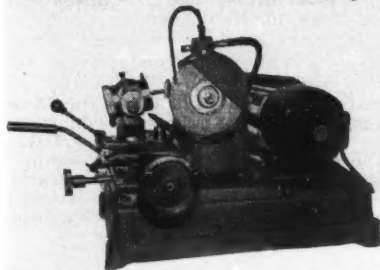


hall collet chucks

All grip—no slip...no bearings, friction, heat or lost power...push out type...full spindle capacity or over...automatic adjustment...work re-set without stopping lathe...2 sizes, 1" and 2" capacities...order now with proper priorities.

HALL MANUFACTURING COMPANY
 622 Tularosa Dr. • Ph. NO 9679 • Los Angeles 26, Cal.

THE MACHINE YOU HAVE BEEN WANTING
THE WHIPPLE TOOL GRINDER
 FOR SPEEDY PRECISION GRINDING ON
 LATHE AND FORMING TOOLS
 Save Time, Critical Material, Guessing



Tool bits precision ground to any degree of angle or radius. Speedy adjustments and fast operation. Tools can be sharpened by removing only one or two thousandths material leaving a perfect razor edge tool in one-tenth the time. Precision grinding on high speed steel, stellite and carbide tools.

Write for literature.

WHIPPLE MANUFACTURING COMPANY
 SPIRIT LAKE IOWA

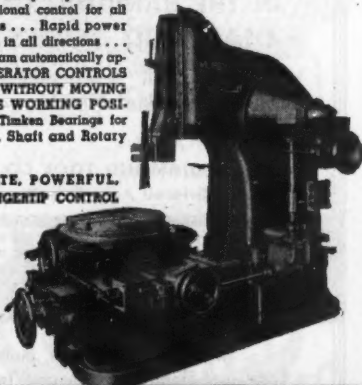
*MOREY Designed and Built
 FOR Precision PLUS Production*

VERTICAL SHAPERS

Four cutting Speeds . . . Infinite feed variations quickly selected . . . Directional control for all movements . . . Rapid power movements in all directions . . . Brake for Ram automatically applied . . . OPERATOR CONTROLS MACHINE WITHOUT MOVING FROM HIS WORKING POSITION . . . Taken Bearings for Bull Gear, Shaft and Rotary Table . . .

ACCURATE, POWERFUL.
 FAST, FINGERTIP CONTROL

Ask
 for
 Circular
 No. 728A



MOREY MACHINERY CO., INC.
 410 Broome Street New York, N. Y.



THE ROAD TO FASTER PRODUCTION

In selecting hack saws that are needed on production lines, you are always on the right road with GRIFFIN. The line is complete . . . a blade for every cutting job . . . the quality proven by 63 years of experience.

General Sales Agent

JOHN H. GRAHAM & CO., INC.
 105 DUANE ST. NEW YORK CITY

Made by G. W. GRIFFIN CO., Franklin, N. H.

GRIFFIN

Hack Saw Blades

BIG Savings

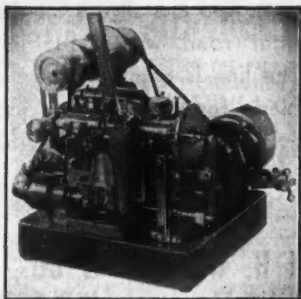
ON GRINDING OPERATIONS WITH METCALF DRESSERS



• Properly dressed wheels grind faster, with greater accuracy — cut grinding costs. Wheels dressed on the Metcalf last longer, hold their shapes longer, perform more efficiently. Trues and shapes wheels up to 1½" thick.

Dealers Write

COVEL-HANCHETT CO.
BIG RAPIDS, MICHIGAN



Pinion and Gear Cutting Machines

Will make 2 or 3 successive cuts for watch pinions or may be used for fine pitch gears up to 1½" dia. Revolving cutter makes successive cuts on blanks held and indexed by work spindle and usually supported by a tail center. Only straight teeth can be cut.

Write for Bulletin No. 112.

Waltham Machine Works

WALTHAM, MASS.

booklet, attendance scoreboards, contests, and the individual approach.

Copies of any or all of these reports will be sent to executives addressing requests on their company letterheads to Policyholders Service Bureau, Metropolitan Life Insurance Co., 1 Madison Ave., New York 10, New York.

Paisley Labeling and Packaging Adhesives. A four-page folder describing various adhesives developed by the Paisley Laboratories for labeling, wrapping sealing, and other packaging operations in all industries is now being issued by Paisley Products, Inc., 1770 Canalport Ave., Chicago, Ill. Copy free.

Douglas Precision Miller for small parts production is the subject of an eight-page catalog prepared by Douglas Machinery Co., Inc., 150 Broadway, New York, N. Y. The catalog fully illustrates and describes the features of the machine and includes a table listing complete specifications, as well as a drawing showing overall dimensions. Copy free.



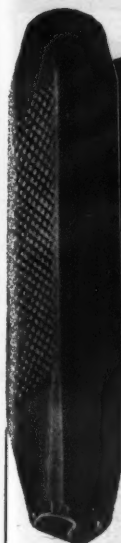
TO INSTRUCT NEW MEN IN THE HANDLING OF DIAMOND TOOLS

we will send you a valuable booklet. No charge, no obligation.

KOEBEL DIAMOND TOOL CO.
9450 Grinnell Ave., Detroit

KOEBELITE
DIAMOND TOOLS

Multi-Point, Multi-Set, Multi-Edge, and Single Set. Diamonds for all Industrial Purposes.



- ◀ Special Anti-Mushrooming
Anti-Chipping Heat-Treat
- ◀ Oversize Shanks
- ◀ Exclusive Knurled Back
- ◀ Exclusive Thumb Grip
- ◀ Broach-Rounded Corners

**A Complete
Engineering Service
on Marking Devices**

Write for Price and Data
Bulletin No. 113-12

NEW METHOD STEEL STAMPS, Inc.

149 Joseph Campau, Detroit

DANLY PRECISION DIE SETS



**Danly
Commercial Sets
Danly
Special Sets**

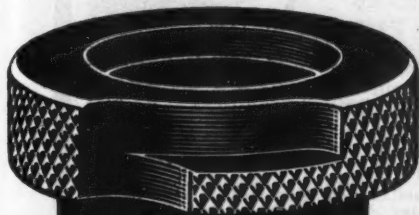
**THEIR
PRECISION**
Means Greater
Accuracy
In Your
Production

DANLY MACHINE SPECIALTIES, INC.

2100 S. 52nd Avenue, Chicago, Ill.

MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Ducommun Metals & Supply Co.
Los Angeles • San Francisco

**DANLY PRECISION DIE
SETS**

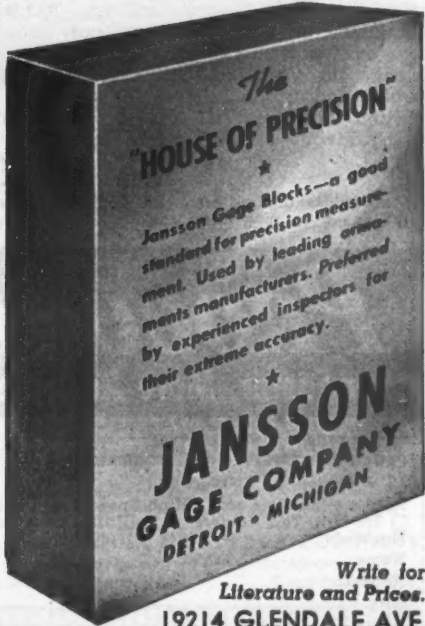


QUICK DELIVERY

Write for Specification
Sheets and Prices . . .

COLONIAL BUSHINGS, Inc.
145 Jos. Campau St., Detroit

**COLONIAL
DRILL JIG BUSHINGS**



*Jansson Gage Blocks—a good
standard for precision measure-
ment. Used by leading orna-
ments manufacturers. Preferred
by experienced inspectors for
their extreme accuracy.*

**JANSSON
GAGE COMPANY**
DETROIT • MICHIGAN

Write for
Literature and Prices.
19214 GLENDALE AVE.

Why Shop Men Prefer These Tapping Machines

In thousands of plants, the men "out in the shop" have watched Procunier Tapping Machines pass the toughest production line tests. They have seen increased tapping output, more accurate tapping, less tap breakage—even with green, inexperienced help. To these men, production results are the only criterion—and for that reason they will recommend "Procunier for tapping."

The definite reasons for Procunier Superior tapping performance include: Extra long compensating springs which assure uniform tapping and reversing pressure independent of operator; all adjustments can be made quickly and easily—such as regulating compensating spring pressure, setting depth stop, changing to any of the four speeds from 390 to 2050 RPM or adjusting timing or flow of tap lubricant. Tap establishes its own lead for greater accuracy. Automatic tap lubricator provides abundant supply exactly when needed. Motor-driven continuous flow lubricant pumps also available. Has exclusive Procunier high-speed tapping head with smooth, sensitive friction clutch and TRU-GRIP tap holder which has many advantages. Many other features.

SEND FOR BULLETIN

giving full details and prices on Procunier Universal Tapping Machines, High Speed Tapping Head and Tru-Grip Tap Holder.

PROCUNIER

For Faster, More Accurate Tapping

PROCUNIER SAFETY CHUCK COMPANY

12 S. Clinton St., Chicago, Ill.

Send me bulletins on: ☐ High Speed Tapping Heads
☐ Tru-Grip Tap Holders ☐ Universal Tapping Machines.

Name.....

Address.....

City..... State.....



**MAIL THIS
COUPON TODAY**

CA
• T
TU
or t
UN
all d
just
shift
spee
Incr

Abe
G
Am
F.
D
W
Auto
of
Bend
Cess

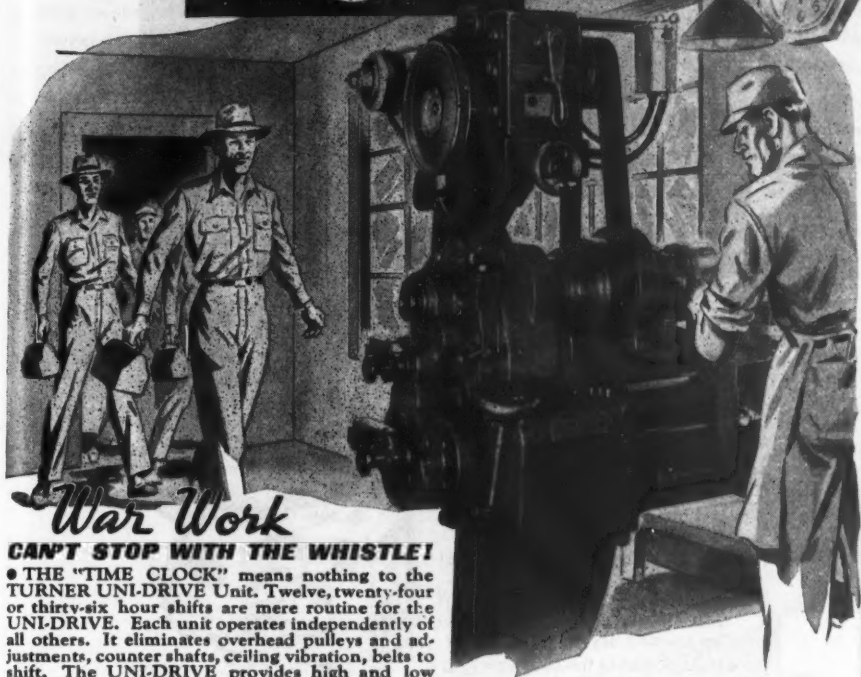


Sept

No "Clock Watcher"

this

TURNER
UNI-DRIVE
Motorizes Machine Tools



War Work

CAN'T STOP WITH THE WHISTLE!

● THE "TIME CLOCK" means nothing to the TURNER UNI-DRIVE Unit. Twelve, twenty-four or thirty-six hour shifts are mere routine for the UNI-DRIVE. Each unit operates independently of all others. It eliminates overhead pulleys and adjustments, counter shafts, ceiling vibration, belts to shift. The UNI-DRIVE provides high and low speeds on all equipment at a touch of the gear box. Increases production capacity 25% to 300%.

Some Users of TURNER UNI-DRIVE

Aberdeen Proving Ground
American Brake Shoe & F. Co. Kellogg Division, Southern Wheel Division
Automatic Sprinkler Co. of America
Bendix Aviation Corp.
Cessna Aircraft Corp.

Chicago, Rock Island & Pacific R. R. Co.
Cincinnati Time Recorder Company
Combustion Engineering Co.
Congoeum Nairn, Inc.
Easy Washing Machine Corp.

Electric Auto-Lite Co.
Frankfort Arsenal
Frisco Lines
Kohler Corp.
Missouri Pacific R. R. Co.
Monsanto Chemical Co.
The New York Air Brake Co.
Oldsmobile Division, General Motors

Pennsylvania Railroad
Perth Ambury Dry Dock Co.
Proctor & Gamble Co.
Republic Steel Corporation
Sheffield Steel Corp.
The Timken-Detroit Axle Co.
Thos. A. Edison Co.
Toledo Scale Co.
Wabash Railway Co.

NOW AT WORK FOR VICTORY ***

The TURNER UNI-DRIVE COMPANY

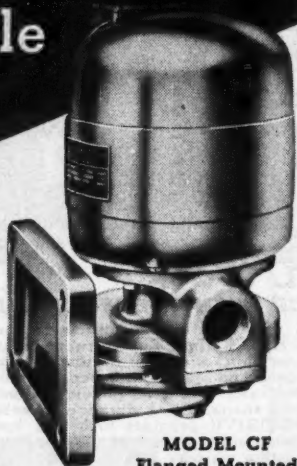
(Sales Division: Turner Machinery Co.)
3416 Terrace St. Kansas City, Mo.

PRODUCING MACHINE TOOL DRIVES • ORDNANCE TOOLS • AIRCRAFT FITTINGS

GILBARCO COOLANT PUMPS dependable... durable

- One of a complete line of pumps for all machining operations.
- Built for twenty-four hours a day service.
- Instantaneous coolant delivery, self-priming, never becomes air-bound.
- Does not build up pressure at slow speeds.
- Positive mechanical seal, ball bearings throughout—unharmful by running dry.
- Built by one of the country's largest pump manufacturers.

Write or wire for literature, prices and deliveries.



MODEL CF
Flanged Mounted

GILBERT & BARKER MFG. CO.
WEST SPRINGFIELD, MASS.

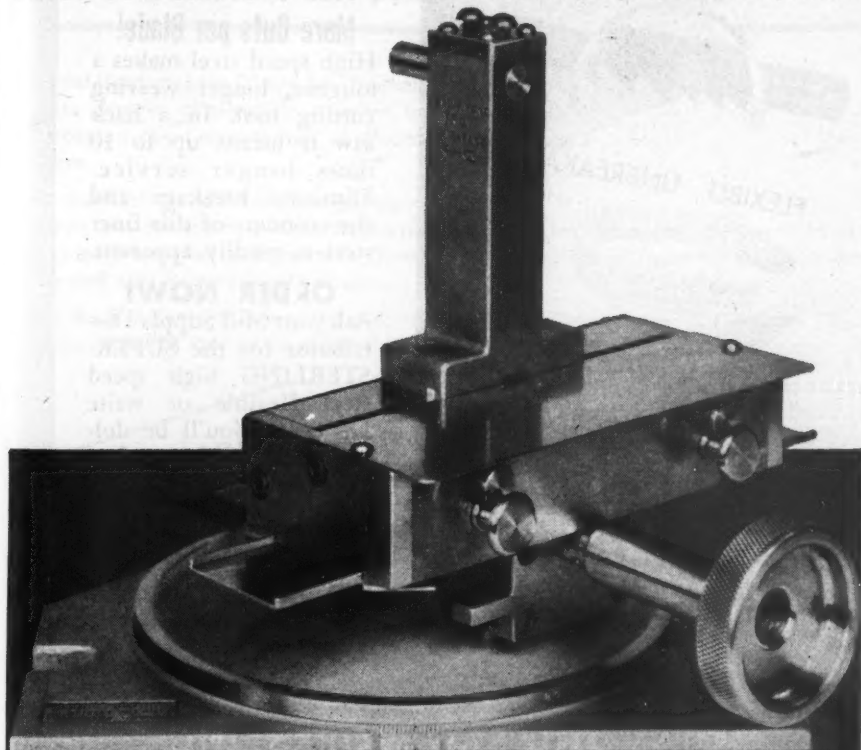
Practical, Sturdy, Accurate

The fact that every part used in its manufacture is carefully machined to a high grade of precision and assembled with care and accuracy, makes the VINCO (B-1) Angle Tangent to Radius Dresser one of the really sturdy dressers in use today.

Rotating on specially designed precision bearings, the action is fast as well as easy and smooth. It can swing an accurate radius and true tangents to that radius without changing the position of the diamond, and it dresses to within .0001" accuracy. This Dresser will give economical and trouble-free service for a lifetime under ordinary operating conditions.

Backed by VINCO's long experience in the manufacture of high precision gages and inspection instruments, the B-1 Dresser is made with the care usually given to the finest and most accurate gages, and therefore is one of the most practical, sturdy and accurate dressers made.

VINCO CORPORATION, 8861 SCHAEFER HIGHWAY, DETROIT 27, MICH.



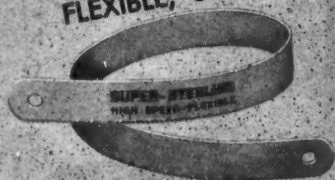
MILLIONTHS OF AN INCH FOR SALE BY **VINCO**

SHATTER-PROOF

Super-Sterling BROACH SAWS



FLEXIBLE, UNBREAKABLE



METAL CUTTING BAND SAWS



Super-Sterling

Flexible — Unbreakable

The high speed steel flexible hand hack saw blade that's *guaranteed* shatter-proof.

More Cuts per Blade!

High speed steel makes a tougher, longer-wearing cutting tool. In a hack saw it means up to 10 times longer service. Eliminate breakage and the economy of this finer steel is readily apparent.

ORDER NOW!

Ask your Mill Supply Distributor for the SUPER-STERLING high speed steel flexible or write Dept. B. You'll be dollars ahead on the production front.

They don't scratch, they cut!

DIAMOND SAW WORKS, INC.
BUFFALO, N. Y.

**PRECISION
TOOL AND CUTTER
GRINDING**

*The
"Oliver Way"*



The cut illustrates the Oliver Ace Tool and Cutter Grinder as regularly supplied for sharpening the General Run of Milling cutters.

The machine as illustrated is equipped with centers for grinding Hobs, Reamers, Taper Reamers, Staggered tooth cutters, etc. Equipment includes an Adjustable Timken Bearing Head with Taper for Mounting End Mills and similar cutters with shanks.

Note the Simplicity of Setup, the ease with which angles are obtained and the possibilities for Rapid Production of individual cutters or quantities of similar cutters.

This is the machine you have heard about; the machine That cutter Manufacturers are using in quantity to Break the Bottle Neck in the production of Milling cutters.

SEND FOR LITERATURE TODAY.

OLIVER INSTRUMENT CO.

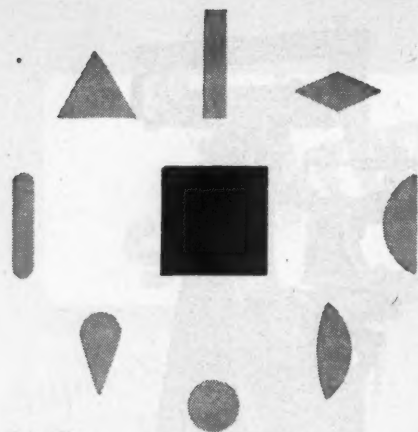
1410 E. MAUMEE ST.

ADRIAN, MICHIGAN

**Don't Neglect
Your Toolroom
It's the Backbone
of Production!**

Oliver
OF ADRIAN

AUTOMATIC DRILL GRINDERS—TOOL
AND CUTTER GRINDERS—DRILL
POINT THINNERS—TEMPLATE
TOOL GRINDERS—FACE MILL
GRINDERS—DIEMAKING MACHINES



They're

ALL

“square”

Only one of the 40 types of “American Swiss” Swiss-Pattern Files is square in shape, but they’re all “square” in value.

For 44 years, these precision tools have been made of only the finest file steel obtainable . . . heat treated by automatic control to within $\pm 5^\circ \text{F.}$. . . made as closely to size as humanly possible—with tolerance of $\pm .002$ ”

in some shapes . . . and cut by conscientious, experienced craftsmen.

You can’t buy a second-grade “American Swiss” file, because every file which does not meet the rigid standards of our inspectors is immediately ruined in an acid bath and scrapped. So, to be sure of getting a “square” Swiss-Pattern file of any desired shape, insist on “American Swiss.”

BUY FROM OUR DISTRIBUTOR

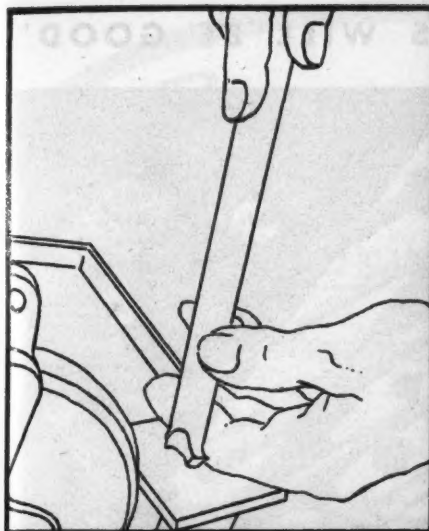
American Swiss File & Tool Co., Elizabeth, N. J.

ASK FOR THEM

BY NAME

American Swiss ★ ★ ★

SWISS PATTERN FILES



IT TAKES
NO SKILL
TO SHARPEN
**BOKUM
TOOLS**

RESHARPENING NEVER CHANGES THEIR FORM

It's the unusual design of Bokum Tools — providing proper angles and clearances — that makes possible increased feeds and speeds for precision boring, bottoming and facing, and internal

threading. Available in sizes to bore holes from $3/32$ " up.

When asking for catalog, specify B-1139 for high speed tools, or B-398 for carbide-tipped tools.

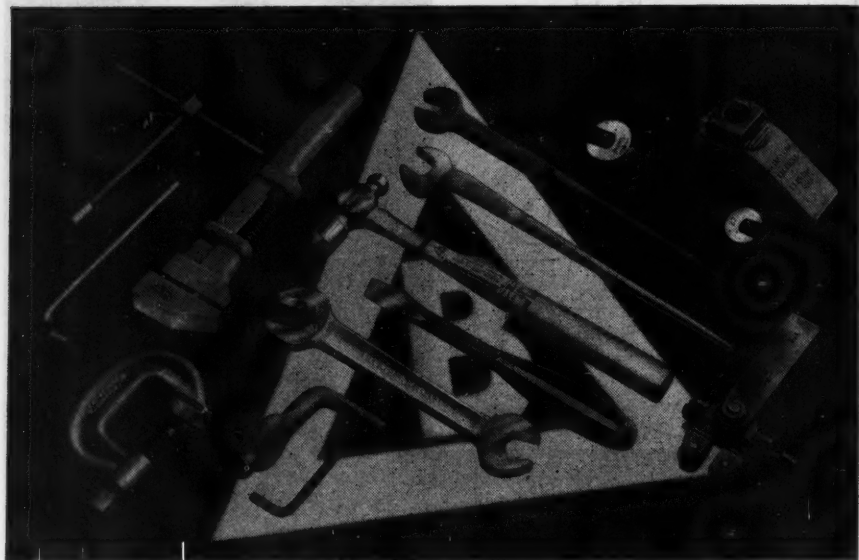
BUY WAR BONDS



BOKUM TOOL CO.

14775 WILDEMERE AVE. • DETROIT 21, MICH.

"BILLINGS ALWAYS WILL BE GOOD"



BILLINGS WRENCHES

The war is not yet won. Much remains to be done. Making Billings Wrenches is going on at top speed . . . "Men of Billings," with plenty of "know how," are shouldering the responsibility of finishing the job they started—to produce more and more Billings Wrenches.

"BILLINGS ALWAYS WILL BE GOOD"

 *Billings* **FORGED TOOLS**
THE BILLINGS & SPENCER CO., HARTFORD, CONN., U.S.A.

SAVE SCRAP

by
Not Making It

Breakage In Straightening Is Negligible with G-F-P Presses

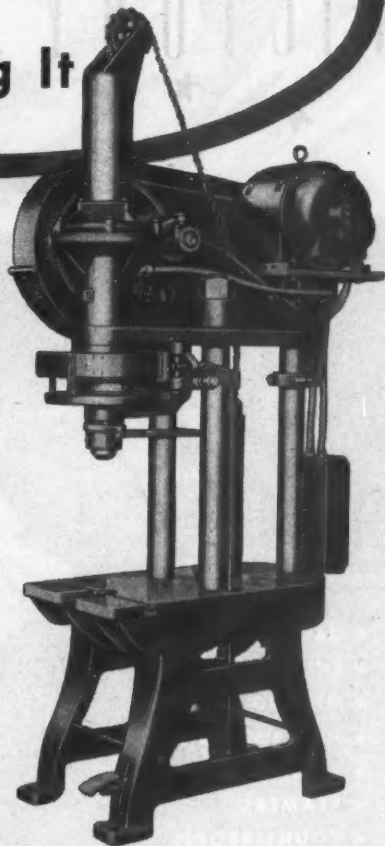
● It is necessary and commendable to save and reclaim all scrap from the shop. It is even more beneficial to the war effort to avoid making scrap in the first place.

General Flexible Power Presses reduce to a negligible amount one source of scrap—breakage of heat treated parts during the straightening operation — because G-F-P Presses are under instant and exact control of the operator. The ram moves only as far, and exerts only as much pressure, as desired by the operator; it releases instantly on release of the foot pedal. It is impossible to strike a snap blow responsible for much breakage.

Write for New Bulletin 371

GENERAL MANUFACTURING COMPANY

6436 Farnsworth Ave., Detroit, Mich.



GENERAL *Flexible*
POWER PRESS

Fine Tools For
VICTORY



- ★ GAGES
- ★ END MILLS
- ★ MILLING CUTTERS
- ★ FORM RELIEVED CUTTERS
- ★ SPECIAL TOOLS
- ★ REAMERS
- ★ COUNTERBORES

FALCON TOOL CO.
DETROIT, MICHIGAN

**WIRE FOR DETAILS AND DELIVERY DATA—
WE'LL GIVE YOU QUICK ACTION!**

WALKER-TURNER MACHINE TOOLS

"Ring the bell" at Bell Aircraft..

War production clearly shows the advantages of using machine tools that fit the job. Walker-Turner units, using up to 1 H.P., handle many jobs better than heavier equipment. Simplified design enables unskilled workers to "break in" quicker; women operators find them less fatiguing, and their unusually wide range of cutting speeds permits using the optimum speed for the job. Perhaps they could cure some of your production headaches, too.

WALKER-TURNER COMPANY, INC.

793 BERCKMAN STREET

PLAINFIELD, N. J.

Photo Courtesy Bell Aircraft



**Walker-Turner Multi-Spindle
20" Drill Press**

Available with or without power feed. Capacity up to 1" in cast iron, $\frac{1}{4}$ " in steel. Standard spindle speeds 260 to 5200 r.p.m. Made also in single spindle, bench and floor models.

walker-turner
COMPANY, INC.
PLAINFIELD, N. J.
U.S.A.

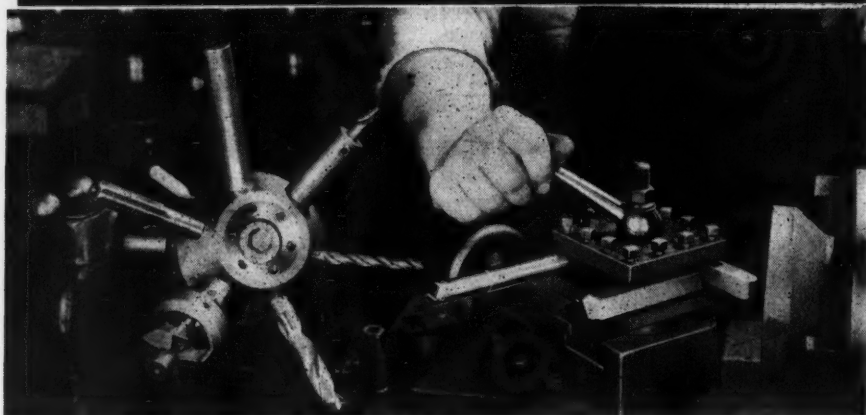
MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

40% Production Increase

PROVEN BY ACTUAL USERS OF

ENCO Lathe Turrets



By increasing tool capacity of tailstock 6 to 1 and tool post capacity 4 to 1, the ENCO Turrets shown above, cut costs sufficiently on the first volume job to save the price of the turrets.

"ENCO" Turret Tool Posts

ENCO Turret Tool Posts are easily operated and easily maintained. Mount rigidly in T-slot of compound. Indexing is easy and positive and turret keeps setting accurately. Numerous users of our turret tool posts are holding limits of .001 plus or minus, without the use of micrometers. 12 position indexing enables the compound to be set at any angle. Carbide hardened steel construction. When ordering, specify make of lathe, swing and maximum tool size used.

- Model S**—Four tool 12 position $2\frac{1}{2}$ " square—takes up to $\frac{3}{8}$ " tool.....\$23.00
- Model H**—Six tool 12 position 3" hexagon—takes up to $\frac{3}{8}$ " tool.....\$25.00
- Model $3\frac{1}{2}$ -S**—Four tool 12 position $3\frac{1}{2}$ " square—takes up to $\frac{1}{4}$ " tool.....\$35.00
- Model 4-S**—Four tool 12 position 4" square—takes up to $\frac{5}{8}$ " or $\frac{3}{4}$ " tool.....\$49.50
- Model 6-S**—Four tool 12 position 6" square—takes up to 1" or $1\frac{1}{4}$ " tool or $1\frac{3}{8}$ " tool holder for $\frac{3}{4}$ " bit.....\$99.00

"ENCO" Tailstock Turrets

The ENCO Tailstock Turret increases the normal tool capacity of your lathe six times. Its positive indexing mechanism tapered and hardened means accurate centering of all tools each time they are indexed for use. In the ENCO your tools are mounted in tool holes bored to close limits after assembly.

- Model A**— $2\frac{1}{2}$ " dia. with No. 1 or No. 2 Morse Taper Arbor and six bored $\frac{5}{8}$ " tool holes.....\$18.95
- Model B**—5" dia. with No. 2 or No. 3 Morse Taper Arbor and 6 bored $\frac{3}{8}$ " $\frac{7}{8}$ " or 1" tool holes; or with No. 4 Morse Taper Arbor and 6 bored 1" tool holes.....\$32.95
- Model B-1**—5" dia. with 1" straight shank and 6 bored 1" tool holes for use on Turret Lathes.....\$37.95

ORDER FROM ENCO DEALER OR WRITE TO US FOR NAME OF NEAREST ENCO DEALERS

ENCO MFG. COMPANY • Dept. I

General Office and Factory:
3321-23 MONTROSE AVE., CHICAGO 18, ILL.

Eastern Sales Office:
118 E. 28TH ST., NEW YORK 16, N. Y.

IDEAL

"Triple-Duty"★

LIVE CENTERS

OFFER

Triple Advantages

1. Take Heavier Loads
2. Turn at Higher Speeds
3. Save Cost of Fast Wearing Dead Centers

Get more work, faster work out of lathes, millers, grinders, etc., with IDEAL Live Centers. They rotate with the work, permit heavier loads—faster speeds—deeper cuts. Highest precision ball bearings for radial load, tapered roller bearing for thrust load. All parts hardened and ground.

★ "TRIPLE-DUTY"—Three interchangeable center pieces for all kinds of centered and uncentered work.



IDEAL

METAL ETCHERS

This new IDEAL all-purpose Etcher indelibly and permanently marks all tools, parts, dies, etc., made of smooth-surfaced iron, steel and their alloys. With 14 different heat gradations available it etches legibly, easily, regardless of the hardness of the metal. Convenient ground clamp for etching large heavy parts and castings.

MOST COMPLETE LINE ON THE MARKET

FREE

IDEAL Sycamore

★ IDEAL COMMUTATOR DRESSER CO ★

1031 PARK AVENUE

SYCAMORE, ILLINOIS

Sales Offices in All Principal Cities

Machine Tool Accessories Catalogue describes many IDEAL Products for speeding War Work.

STANDARDS* **(Live Centers)** *shipped from* **STOCK**

***No. 2 to No. 6 Morse taper . . . Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Send us your blueprints and specifications—we will see that your job gets set up with the right Live Center.**

STURDIMATIC
TOOL COMPANY
5222 THIRD AVE. DETROIT, MICH.

DOUGLAS PRECISION SLOTTER

Swiveling ram head
and tool holder, auto-
matic circular table
and independent
automatic feeds in all
directions.

7" TO 10" STROKE

PROMPT DELIVERY

DOUGLAS MACHINERY CO. INC.

150 BROADWAY

NEW YORK, N. Y.

4483

STEEL BOXES

For Your Production Needs

STYLE 300 STACKING BOX

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handle each end. Runners save wear on bottom of box and act as positive stacking lock.



STYLE 600 STACKING BOX

An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and reinforce box at point of maximum wear.



STYLE 500 STACKING BOX

Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 Boxes.



Immediate Shipment!

No. 301—6"x 9" x3½"—20 ga., \$.55 Each
No. 302—8"x12" x4"—20 ga., \$.60 Each
No. 303—9"x13½"x4½"—19 ga., \$.75 Each

**PRICES F. O. B.
FACTORY, PHILADELPHIA
ANY QUANTITY.**

No. 601—10"x16"x6"—18 ga....\$.95 Each
No. 602—12"x18"x8"—16 ga....\$1.25 Each

**ORDER TODAY,
WRITE, WIRE
OR PHONE**

No. 501—10"x16"x6"—18 ga....\$1.15 Each
No. 502—12"x18"x8"—16 ga....\$1.50 Each

AMERICAN METAL WORKS, INC.

1501 Germantown Ave., Philadelphia 22, Pa.

Grobet

ROTARY FILES

OVER 5000 SHAPES SIZES AND CUTS

Generation after generation of tool makers, instrument makers and die makers have accepted the "F. L. Grobet", Rabbit Trade Mark as a guarantee of precision and performance. Over a century and a quarter of progress and manufacturing excellence is integrated into every Genuine Grobet Precision Swiss File.

Learn more about these Swiss Files, made of chrome steel for greater durability. Write for catalog KF, the most complete of its kind. Also ask for catalog KM on Files for Filing Machines.

GROBET FILE CO. of AMERICA

421 Canal Street



New York, N. Y.

IMPORTERS OF GROBET SWISS FILES

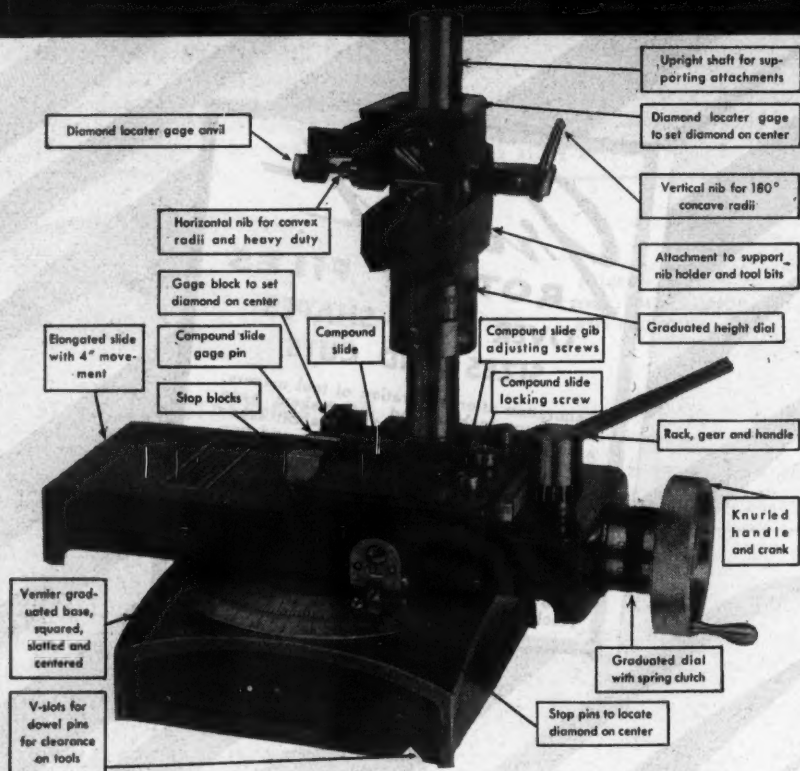
DEALERS OF GROBET ROTARY FILES

September, 1943

MODERN MACHINE SHOP

377

THE *New* MEYERS Microform WHEEL and TOOL FORMER



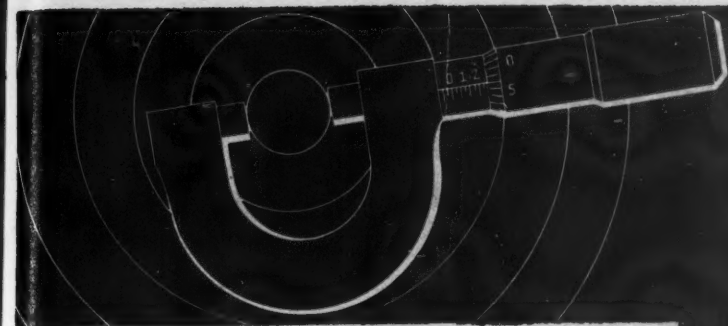
CUTTING TOOLS ARE CRITICAL!

According to Government figures, more than 9 million workers who have had no previous metal-working experience are today using cutting tools. Inevitably this results in much waste of time and tools, slowed-up operations, work-spoilage and shutdowns for tool replacement and grinding.

This new MEYERS tool is helping solve this problem by saving hours of time on sharpening jobs and keeping metal and woodworking tools in A-1 condition. Even the most difficult contours—on both tools and grinding wheels—are completed in far less time than the old trial and error method.

Write for literature and prices.

W. F. MEYERS CO., 1014 14th St., BEDFORD, INDIANA



GUNMAKER

SPEEDS UP PRODUCTION

443%

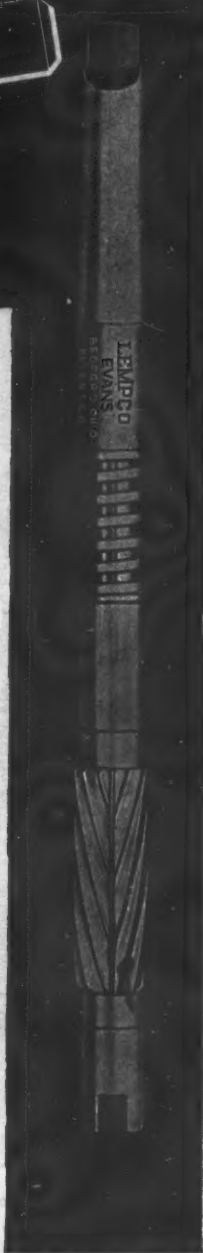
They used to finish 33 gas cylinders per hour to $\pm .000$ " and $-.0005$ " tolerances. Now, with Lempco-Evans Hi-Speed Steel Reamers, 133 gas cylinders are finished per hour. Furthermore, the excessive and costly wear on the plug gauges, caused by abrasive left in the holes, has been completely eliminated. A minimum of 1000 pieces are reamed before the removable blade segments require resharpening, which is done easily and economically. If you finish holes in aluminum, bronze, iron, steel, or nickel alloys, it will likely pay you to switch to Lempco-Evans Reamers. Send blueprints for special jobs.

Only LEMPCO-EVANS OFFERS YOU ALL THESE:

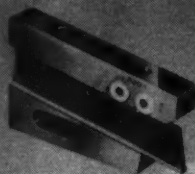
- Finishes within .0001"
- Makes Clean Holes (no abrasive grit)
- Extension Pilots for Alignment Jobs
- Locked-in Patented Blades Prevent Chatter
- Produces Chrome-like Bearing Surface
- BLADES ARE HI-SPEED STEEL, heat-treated and hard chrome-plated
- Straight Line Expansion from .030" to .080" (Sizes under 1 1/16" slightly less)
- Opposite spiral blades, shearing simultaneously, ream smoothly over slots

LEMPCO

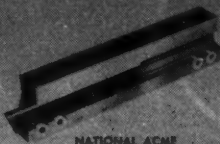
5717 DUNHAM RD. • BEDFORD, OHIO



EMPIRE TOOL COMPANY'S LUERS PATENTED CUTTING-OFF BLADES AND HOLDERS



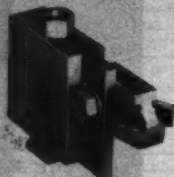
GRIDLEY AUTOMATIC—
3½ AND 4½—SINGLE SPINDLE



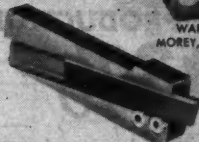
NATIONAL ACME



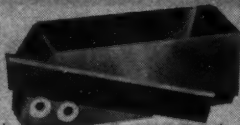
NEW BRITAIN AUTOMATIC



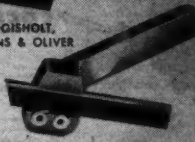
BROWN AND SHARPE



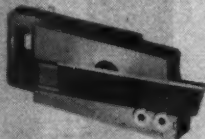
CONE AUTOMATIC



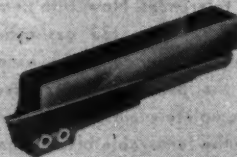
WARNER & SWASEY, GISHOLT,
MOREY, FOSTER, BARDONS & OLIVER



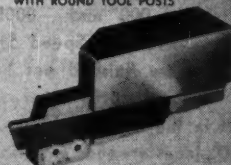
LATHE & HAND SCREW MACHINES
WITH ROUND TOOL POSTS



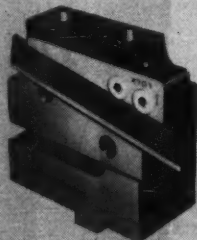
CLEVELAND & VERTICAL
CUT-OFF



ACME-GRIDLEY R, RA AND
RAS SERIES



GREENLEE AUTOMATIC
4- AND 6-SPINDLE



GRIDLEY MODELS P & G
AUTOMATICS—4 SPINDLE

Empire Tool Company manufactures Luer's Patented Cutting-Off Blades and Holders under license issued by John Milton Luer's Patents, Inc.

THE BLADES THAT
REDUCE FRICTION

MADE TO FIT ANY HAND OR AUTOMATIC SCREW MACHINE

They are today in use in every leading plant in the country where the production of war requirements is dictating speed in cutting-off operations.

Luer's Blades eliminate excessive friction, therefore reduce breakdowns. They require less frequent grinding, therefore show longer productive periods.

Luer's Holders are so designed as to permit quick removal and replacement of blades without disturbing original setup. The top clearance, or rake, which has been incorporated in them eliminates hand grinding of lip on top of blade—a time-saving factor.

There are many more important reasons why you should be using these blades and holders. Better send for a complete catalog showing the particular type that will fit your machines.

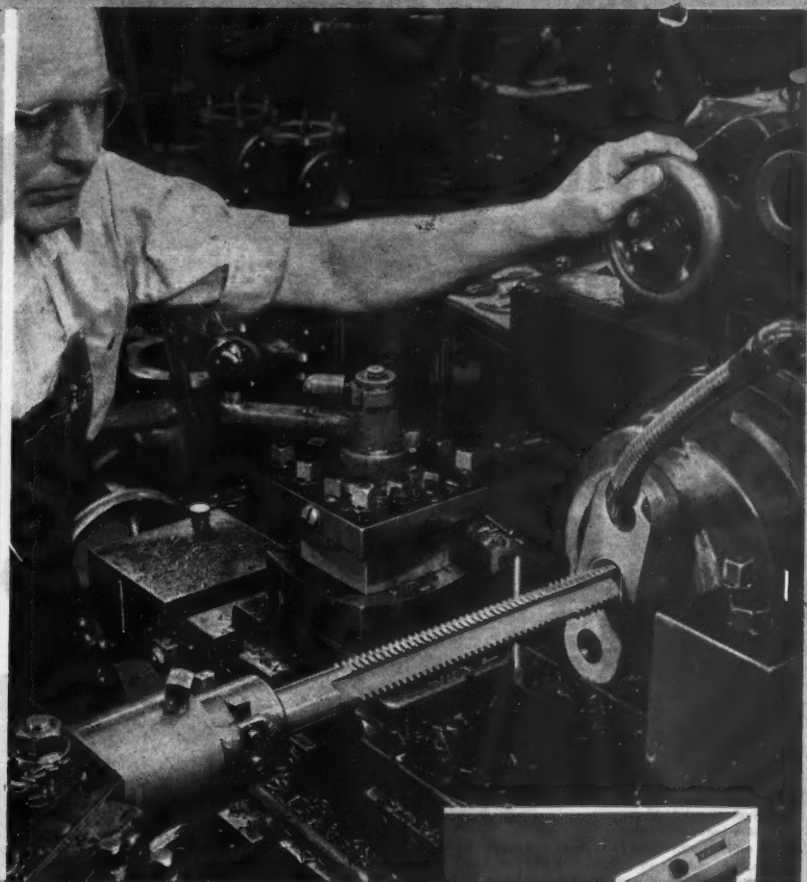
Yes, we have a holder for your machine, even if it isn't shown here.

BUY WAR BONDS

EMPIRE Tool Co.

8774 Grinnell Ave.,

Detroit 13, Michigan

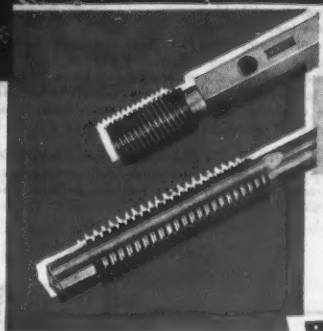


ACME of Precision

VARD makes high precision Acme Taps and Gages. In the picture above is shown a $1\frac{1}{8}$ "-4 Acme tap. This tap is designed to rough and finish in one pass. VARD Acme Taps may be obtained in sets, 2 to 4 in a set, to meet your requirements.

VARD Acme Ring, Plug, and Roll Thread Snap Gages are available on order in any pitch or lead, in diameters up to 6 inches.

Write for data on cost and delivery.



VARD INC.

PASADENA, CALIFORNIA

30 MINUTES—FLOOR TO FLOOR TIME

10 holes

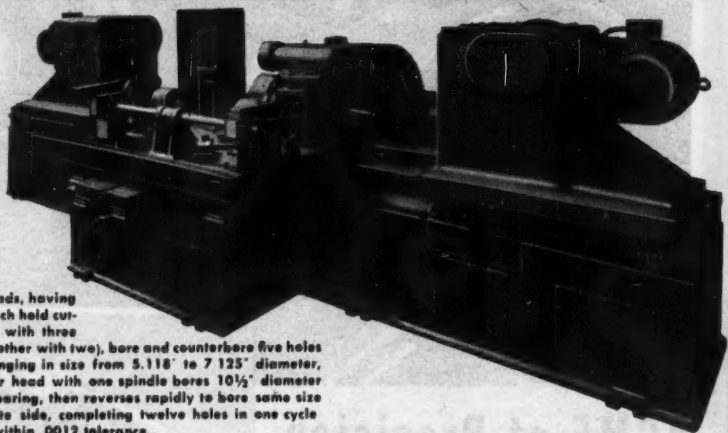
5" to 7" in dia.

and 2 holes

10½" in dia.

**BORED AND COUNTERBORED IN THIS HUGE
DIFFERENTIAL AND FINAL DRIVE HOUSING
ON THIS NEW LE MAIRE HYDRAULIC**

3-WAY BORING MACHINE



The two end heads, having two spindles each held cutter arbors (one with three cutters and the other with two), bore and counterbore five holes at each end, ranging in size from 5.118" to 7.125" diameter, while the center head with one spindle bores 10½" diameter hole in large bearing, then reverses rapidly to bore same size hole on opposite side, completing twelve holes in one cycle. All work held within .0012 tolerance.

This is another example of the unusual machines that are engineered and built here at Le Maire to meet difficult situations—how we have enabled manufacturers to speed up their production by having one machine perform work that formerly required batteries of machines to do the same job.

Do you want more production? Perhaps the development of a higher capacity machine—one doing several things at once—is what you should have. Would you like to have us study your problem and suggest an answer?

**BUY
WAR BONDS**

LeMaire TOOL & MFG. CO.

2659 S. TELEGRAPH ROAD  DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

PART NUMBERS

LETTERING

GRADUATIONS

ROLLED

BY MACHINE

ON

FLAT and ROUND SURFACES

Sure - Fast - Accurate

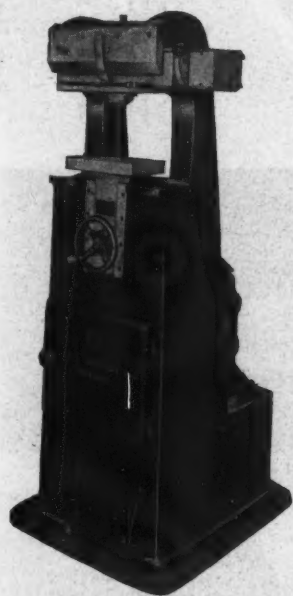
OBSOLETE HAND STAMPING

SAVES

[PARTS
LABOR
STAMPS

Eliminates POOR MARKING
ERROR — NOISE

Speeds . . . DELIVERIES



MODEL 175

ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

Designed and Built By

GEO. T. SCHMIDT, INC.

1806 BELLE PLAINE AVENUE

CHICAGO, ILLINOIS

This Series No. 3 Niagara Power Squaring Shear is typical of the many sizes and capacities which are resulting in more production per hour. The Niagara line of shears is the most complete in the industry and offers the most economical answer to shearing requirements up to 20 feet. Niagara Machine & Tool Works, Buffalo 11, N. Y. District Offices: Detroit, Cleveland, New York.



Shear knives available for cutting alloy and special steels. Let us know what you desire to cut. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

**Buy United States
War Bonds and Stamps**



» » TO SPEED
PRODUCTION
HERE'S
DOUBLE-BARRELED
ACTION

WE'VE STEPPED UP REAMER PRODUCTION

With new machines, new expediting methods, and new planning schedules, we have been able to step up the manufacture of Wetmore Reamers and Boring Bars to the point where we can make stock delivery of standard types and sizes, and unusually good delivery on other items.

SO YOU CAN SPEED UP WAR PRODUCTION

The faster cutting and finer finishes you get on precision holes with Wetmore quality tools mean less machine time per piece . . . less manhours per piece . . . less spoilage . . . longer life of tools . . . less tool setting and maintenance.

WETMORE DESIGN FEATURES

Light construction, with protected blade back and extra heavy blades, insure better finish without digging in or chattering . . . threads milled on centers, blade seats ground true with threads, and blades always bottomed, permits holding to close tolerances . . . blades may be set out 7 to 50 times, depending on size . . . and heavier cuts may be taken because of rugged construction, scientific grinding and quality materials.

STOCK DELIVERY. Tool up now for higher war production, and be ready also for the post-war accumulated demand for consumer and other goods.

WRITE OR PHONE us for quotations and delivery dates, and for the Wetmore Tool Catalog. If you don't subscribe, please . . .

WETMORE REAMERS . . . BORING BARS



WETMORE REAMER CO., 418 N. 27th St., Dept. E., Milwaukee 5, Wis.

Spiral REAMERS

IN ADDITION TO
STRAIGHT FLUTE
TYPES



Average Delivery 30 days

In Any Size	•	In Any Type
Spiral Flutes	•	.085 to .625
Straight Flutes	•	.040 to .625

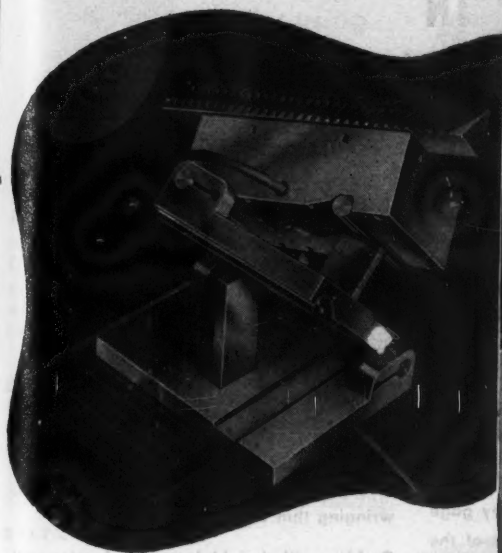
WRITE • WIRE • OR PHONE

Metal Cutting Tools
and Manufacturing Company

11121 Grand River Avenue • Detroit, Michigan

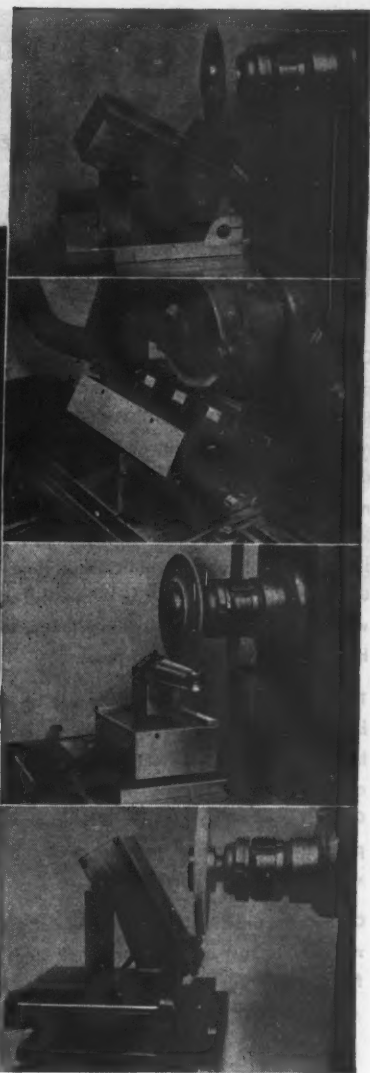
★ BUY WAR BONDS ★

Any ANGULAR
GRINDING SET - UP



**Can Be Completed
QUICKLY, ACCURATELY
with MAGNA-SINES**

Magna-Sines are adjustable in a few seconds time to any angle . . . either single or compound . . . with assurance of accuracy to gage block limits. A flip of the switch and work is held magnetically with no possibility of it changing position during grinding operations.



WRITE FOR FULL INFORMATION

The MAGNA-SINE

ROBBINS ENGINEERING COMPANY

318 MIDLAND AVENUE

DETROIT 3, MICHIGAN

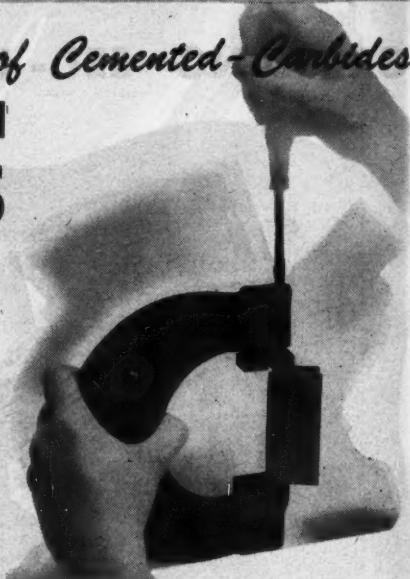
ANOTHER LINCOLN PARK "First"

The Wear-Resistance of Cemented-Carbides NOW AVAILABLE IN GAGE BLOCKS

Carblox—Lincoln Park's new cemented-carbide gage blocks—provide the means to greatly reduce the wear error in gage block use. Sets of gage blocks made of other materials, and which are used continuously as master or working sets for comparative measurements, wear rapidly and will show a loss in size of a few millionths to as much as several ten thousandths of an inch within a short time. Carblox will retain their accurate size within the allowable wear tolerance at least fifty times longer than steel blocks used for the same purpose.

The greatest wear factor in the use of any gage blocks is caused by abrasion on the ends of the build-up. A relatively small amount of wear is caused by the wringing together of the blocks. Carblox used on each end of a build-up will act as protective anvils and prevent wear on the less wear-resistant steel blocks.

Carblox are practically non-magnetic and are highly resistant to rust or corrosion. Their high cohesive factor facilitates the wringing of thin blocks and



eliminates the difficulties now encountered in wringing thin steel blocks.

Carblox, with their high wear resistance, will maintain their original accuracy for a long period of time . . . will largely eliminate the customary necessity of checking blocks . . . will greatly increase the usable accurate life of all gage block sets . . . will reduce to a minimum scrap or rejections that might result from the use of worn gage blocks.

WRITE FOR COMPLETE DETAILS

CARBLOX



LINCOLN PARK TOOL and GAGE CO.

LINCOLN PARK, MICHIGAN

It does
for re
in hu
from
saves
while
on an

The
good-
plant.
of thi
for th

Ask
Mail

DELT.

1. Wo
feed o
off mo
rates o
spindle

2. One
tion br
to work
lever st

3. Auto
depth o
toleranc
turns au

4. Ins
from h
operatio
hand dr

Year out
and m



Septen

Boost War Production

with your present labor
force . . . by using
**DELTA Power-Feed
DRILL PRESSES**

It doesn't cost a fortune or entail a long delay for retooling. Standard low-cost Deltas, used in hundreds of war plants, give quick relief from production "jams." Speedy operation saves time, power feed works automatically while operator loads another jig or works on another spindle.

These are thoroughly engineered, substantially built, good-looking machines, made in a modern machine-tool plant. Advanced design combines best features of machines of this type. Safe, dependable, performance quickly pays for the machines and confirms your good judgment.

Ask your Delta distributor about priorities and deliveries. Mail the coupon for new Delta catalog.

DELTA FEATURES

1. Worm-driven power feed operates directly off motor — giving 8 rates of feed for each spindle speed.

2. One swift hand motion brings drill down to work—slip of power lever starts power feed.

3. Automatic stop holds depth of holes to close tolerances; spindle returns automatically.

4. Instant switching from heavy power-feed operations to sensitive hand drilling.

Tear out this coupon
and mail **TODAY**



With one-piece tables: Floor and bench types, single spindle; floor type, 2- and 4-spindle. With sectional tables: Floor type, 3-, 4-, 5-, 6-, and 8-spindle. Slo-Speed or High-Speed No. 2 Morse Taper or 1/2" Jacobs Chuck spindle.



THE ARMY-NAVY "E"
—awarded for excellence
in the production of machine
tools vitally needed
in the war effort.



M-90

THE DELTA MANUFACTURING CO., 602K E. Vienna Ave., Milwaukee 1, Wis.
Please send me your new catalog giving full details on Delta Power-Feed Drill Presses and your full line of low-cost machine tools.

Name _____ Position _____

Company _____

Address _____

City _____ State _____

Hanna *Riveting Presses* *Tailored to your job!*



...that means
MORE PRODUCTION
with LESS TIME and LABOR

HANNA Riveting Presses will enable you to attain maximum riveting and upsetting production in less time, with less labor, at less cost . . . and here's why: Hanna designs and builds riveting presses "tailor-made" to meet specific riveting or upsetting production problems. Completely automatic in operation. Hanna Presses drive from one to six or more rivets simultaneously—with a single rapid and smooth stroke.

For more than 40 years Hanna has designed and built equipment to perform most every imaginable riveting and upsetting operation—this broad background of consulting, designing and manufacturing experience is yours for the asking. We invite you to call in a Hanna Engineer to study your problems. There's no obligation, of course.

HANNA ENGINEERING WORKS

1765 ELSTON AVENUE • CHICAGO 22, ILLINOIS
AIR & HYDRAULIC CYLINDERS • RIVETERS • AIR HOISTS

PROMPT DELIVERY Tungsten Carbide Tipped Tools

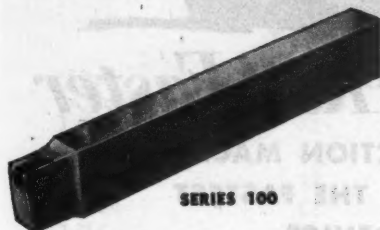
Price \$1.00 Each In Any Size

New Low Prices—Increase Production—Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown



Tool No. RH	LH	Shank Size
R-100	L-100	$\frac{1}{4} \times \frac{1}{4} \times 2$
R-101	L-102	$\frac{5}{16} \times \frac{5}{16} \times 2\frac{1}{4}$
R-103	L-104	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
R-105	L-106	$\frac{7}{16} \times \frac{7}{16} \times 3$
R-107	L-108	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$

200 Series

Tool No.	Shank Size
200	$\frac{1}{4} \times \frac{1}{4} \times 2$
201	$\frac{5}{16} \times \frac{5}{16} \times 2\frac{1}{4}$
202	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
203	$\frac{7}{16} \times \frac{7}{16} \times 3$
204	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$



Below— 300 Series

Tool No.	Shank Size
300	$\frac{1}{4} \times \frac{1}{4} \times 2$
301	$\frac{5}{16} \times \frac{5}{16} \times 2\frac{1}{4}$
302	$\frac{3}{8} \times \frac{3}{8} \times 2\frac{1}{2}$
303	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

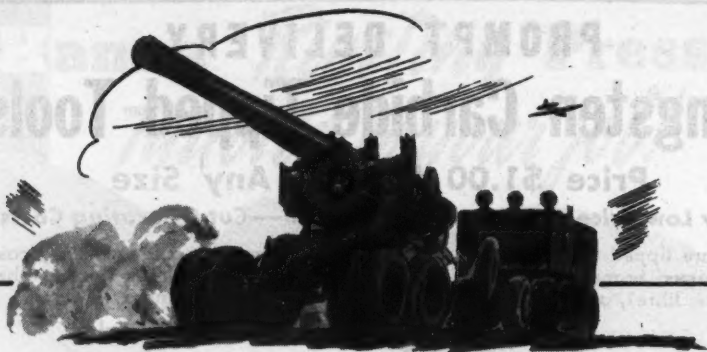


Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits.

VICTOR MACHINERY EXCHANGE, INC.

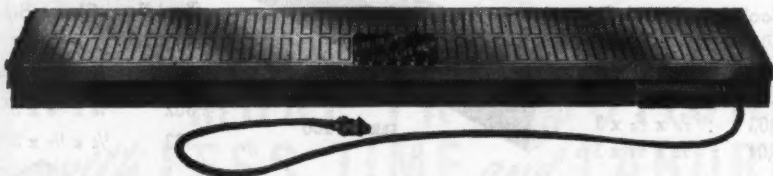
251 CENTER STREET Phone: CAnal 6-5575 NEW YORK, N. Y.



The Caissons Roll Faster

**FROM WAR-PRODUCTION MACHINES
EQUIPPED WITH THE FASTEST
SET-UP DEVICE**

Superpower Magnetic Chucks



WAR MATERIEL moves to completion at the double quick, when set-up time is saved by Superpower Magnetic Chucks. With a Superpower on his machine, an operator simply positions a large casting or hundreds of small pieces on the chuck faceplate . . . flicks the switch . . . and that's all there is to it. Magnetism holds the work immovably under heaviest feeds of grinding wheels or cutting tools. Thus hours of delay are salvaged for

working . . . which sharply increases the production not only of grinders, but of millers, planers, lathes, shapers. Work-range is also widened by the greater versatility of set-up made possible by Superpower. The complete mechanical story of the world's most powerful and reliable magnetic chuck is told in a new twelve-page, profusely illustrated publication which you may have by writing, on your firm's letter head, to:

THE TAFT-PEIRCE MANUFACTURING COMPANY

WOONSOCKET



RHODE ISLAND

LONG LENGTH HIGH SPEED DRILLS

9" Cutting Flute

12" Long



Prompt Delivery

Size Inches	Length Overall Inches	Length of Flute Inches	Our Price Net Each High Speed
1/8	12	9	\$3.00
9/64	12	9	3.00
5/32	12	9	3.00
11/64	12	9	3.00
3/16	12	9	3.00
13/64	12	9	3.25
7/32	12	9	3.25
15/64	12	9	3.25
1/4	12	9	3.50
17/64	12	9	3.50
9/32	12	9	3.50
19/64	12	9	3.50
5/16	12	9	3.75
21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
3/8	12	9	4.00
25/64	12	9	4.00
13/32	12	9	4.25
27/64	12	9	4.25
7/16	12	9	4.50
29/64	12	9	4.75
15/32	12	9	4.75
31/64	12	9	5.00
1/2	12	9	5.00

VICTOR MACHINERY EXCHANGE, INC.

251. CENTER STREET Phone: CAnal 6-5575 NEW YORK, N. Y.

SERVICES DIRECTORY

**GRINDING • STAMPINGS • TOOL and DIE WORK
MACHINE WORK • CASTINGS • HEAT-TREATING
FORGINGS • EMPLOYMENT • BUSINESS • ETC.**

PATTERNS

Wood and Metal — also Match Plates.
For all kinds of castings—large or small.
Estimates on Request.

GENERAL PATTERN WORKS

2231 Buck St., North of Harrison Ave.
Phone MAin 4751 Cincinnati, Ohio

AUTOMATIC AND HAND SCREW MACHINE PRODUCTS

... up to 2" diameter — any material —
small or large quantities. Prompt service.

IMSANDE SCREW PRODUCTS CO.

3517 Cardiff Ave., Oakley, Cincinnati, Ohio

CENTERLESS GRINDING

SINCE 1925

CINCINNATI

ICE PICK & TONG MFG. CO.

118 BURROWS ST. • CINCINNATI, O.

GRIND THE

Eastern Centerless Way

Our new plant with
increased facilities
assures

PROMPT SERVICE

Eastern Centerless Grinding Co.

Incorporated
470 Tolland St. East Hartford, Conn.

PRECISION GROUND

GEARS THREADS

CAMS SPINES

Excellent facilities for grinding
gears, cams, threads and splines
on a contract basis.

SEND BLUEPRINTS FOR ESTIMATE

HARTFORD SPECIAL MACHINERY COMPANY

Hartford, Conn.

CENTERLESS GRINDING

*Straight, Cylindrical, Shoulder, Profile, and
Multiple Diameters . . . Ground Taper Pins
Screw Machine Products. Heat treated and
ground if necessary. Improved and expanded
facilities insure prompt and accurate service.*

Send blueprints or samples for estimates.

PORTER MACHINE CO.

3139 Enyart Ave., Oakley, Cincinnati, Ohio

A COMPLETE

PRECISION GRINDING SERVICE

CENTERLESS GRINDING

INTERNAL CYLINDRICAL GRINDING

EXTERNAL CYLINDRICAL GRINDING

BLANCHARD SURFACE GRINDING

PLAIN SURFACE GRINDING

THREAD GRINDING

Send Blueprint Sketch or Samples for Quotation



ACE
MANUFACTURING CORP.
1235 E. Erie Avenue
Philadelphia, Pa.

Hand Screw Machine Products

UP TO 3" BAR OR CHUCK.
PRODUCTION MILLING ON DUPLICATE
MACHINE PARTS.
GAUGES, JIGS, FIXTURES AND SPECIAL
MACHINES.

BEAVER MACHINE & TOOL CO.

1137 W. Beldon Ave. Syracuse, N. Y.

"Toolife" Cutting Oil Agents wanted throughout U. S. for specialized sulphurized and nonsulphurized compounds—increased tool life over 20% proven—no dermatitis—must be acquainted with trade—state experience, details. Box 92, Modern Machine Shop, 431 Main Street, Cincinnati 2, Ohio.

CENTERLESS GRINDING

Work wanted. (New, Cincinnati No. 2) also, surface grinding; precision lathes, milling, drilling and cylindrical grinding small parts to very close tolerances. Good delivery.

PRECISION PARTS, INC.

17 Thompson St. New York, N. Y.
Wa. 5-3518-9

Carboloy Training Course for Carbide Die Users

To meet the increased need for trained die-room employees resulting from the vast increase in the use of cemented carbide dies in connection with war production, a special training course for users of carbide dies has been put into operation at Carboloy Co., Inc., 11143 E. 8 Mile Rd., Detroit 32, Mich. The course is intended both as a training course for new employees of carbide die users and a "refresher" course for more experienced die service men. For the latter as well as the former, it serves to acquaint the men with the vast changes and improvements in carbide die servicing methods and equipment made available during the last year or so.

The die training course is designed along lines similar to the training course conducted at Carboloy for carbide cutting tool users in that it embodies actual shop training in the subjects selected. The curriculum, moreover, is arranged so that each man may select only the subjects of specific interest in connection with his duties at the mill.

The course is available to individuals selected by any user of cemented carbide

BAKELITE SILENT GEAR SERVICE

ALL SIZE BLANKS IN STOCK.
Teeth Cut To Your Specifications.
Prompt Delivery. Write for quotation.

GREAVES MACHINE TOOL COMPANY

2009 Eastern Avenue Cincinnati, Ohio

WANTED

First class man for advertising department of old established machine tool concern. Splendid opportunity for one who can assume responsibility. Write Box No. 98, MODERN MACHINE SHOP, 431 Main Street, Cincinnati 2, Ohio.

DESIGNER WANTED

By old established company manufacturing small tools. Splendid opportunity for first class man. Give particulars regarding experience, age and salary expected. Write Box No. 95, MODERN MACHINE SHOP, 431 Main Street, Cincinnati 2, Ohio.

dies regardless of make. Individuals selected should preferably be men who will function in key positions in die service rooms, and so on, to enable them in turn to train other men on return to their mills. All men taking the course must be citizens of the United States.

The Carboloy die training course is under the direction of A. E. Glen, Die Engineer of the Carboloy Company, and is conducted without charge. No special equipment is required, although men attending may bring special carbide dies from their mill for actual work training on such dies, if desired. Experience to date has demonstrated that a minimum of three days is required for each subject.

Among the subjects offered are the following: Round Hole Carbide Drawing Dies—(a) Finishing blank nibs and small cored dies, (b) Finishing medium size cored dies, (c) Finishing large cored die sizes; Carbide Shape Dies—(a) Finishing standard square and hex cored dies, (b) Finishing special shapes; Cartridge Case Dies—(a) Finishing cored dies for .30 and .50 cal. cartridge cases, (b) Finishing similar dies for 20 mm. and over, (c) Tube drawing mandrels, (d) Die room layout and control.

KNOBBY THE WAR WORKER

by HAM FISHER



Hammond Rotary Automatics. An eight-page bulletin illustrating and describing 6 and 8 work-spindle model rotary table automatics and their use in burring, brushing, polishing, and buffing a wide variety of parts is announced by Hammond Machinery Builders, Inc., 1615 Douglas Ave., Kalamazoo 54F, Mich. Specifications of both model machines are conveniently tabulated for ready reference. Copy of Bulletin No. 401 is available free of charge to executives addressing a request on their company letterhead.

Tru-Line Engineered Diamond Tools. Wheel Trueing Tool Co., Inc., 3200 W. Davison Ave., Detroit 8, Mich., is now issuing a 16-page catalog featuring its line of blade type diamond tools for wheel dressing. The catalog describes and illustrates the designs of these tools and shows forms which can be quickly and accurately dressed with them. Illustrations showing equipment and workers involved in the production of Tru-Line Diamond Tools are also presented in the catalog, copy of which is available free upon request.

THE LONG LIFE . . . THE ACCURACY *of these Special Cutting Tools*

Are Helping to Speed Production of GUNS and SHELLS

Some of the most unusual and "difficult to produce" high speed steel cutting tools have been and are being manufactured by Morse Tool Company.

Among the many special tools produced by this company are various types of reamers such as those pictured here. Other Morse Tool products include special milling and form relieved cutters, as well as complete lines of standard tools.

If your present needs call for high speed cutting tools made exactly to the tool design, dimensions and tolerances shown on your drawings, Morse Tool Company can meet your requirements. Today, and in your post-war production, the experience of this company can prove invaluable in helping you to reduce costs and get greater efficiency in your cutting operations.



A combination drill and step reamer in which the flutes extend for the full length of the tool. As cutting edges become worn, the flutes can be cut back, providing the tool with extremely long life.



A reamer used in shell manufacture. This tool has a special lubricating and chip removal feature. Lubricant comes through a hole in the center of the tool and emerges from holes at end, forcing chips back and preventing packing or clogging in cutting operations.

Morse Tool Company

116 E. GOLDENGATE ST.
DETROIT • MICHIGAN

The Last Word . . .

MCARTHUR and his men are slowly but surely driving the Japs out of the South Pacific; English and American forces, working together, are moving in on Axis territory; the Russians are rolling the German armies back on the Eastern front. Altogether, we have grounds for optimism, but we must not overlook the fact that the hardest fighting and our most severe losses are yet to come.

Hitler's armies are spread all over France, Italy, the Low Countries, Norway, and for a thousand miles along the Eastern front. As they are driven in they become more concentrated; their lines of communication become shorter, and they are able to present a more solid wall of resistance. Our Mediterranean forces have already fought some hard battles and still haven't landed on the Italian mainland. And when they have conquered all of Italy the real battle for Europe will have just begun.

In the South Pacific our forces have, after a year and a half, driven the Japs out of the Solomon Islands and are just now starting in on New Guinea. From one end of the Island of New Guinea to the other is some 1,400 miles. After that territory has been reclaimed we still have to clean the Japs out of Borneo, Sumatra, Malaya, the Philippines, Thailand, French Indo-China, and Burma before we can combine with the Chinese armies for a final drive in the direction of Tokyo.

However, there is no question about the outcome. Allied armies will march through the streets of Berlin—what there are left of them—and American warships will stand off the coast of Japan with guns trained on Yokohama and Tokyo while the American Peace Commission receives the Japanese surrender. That day will mark the close of the old era and the beginning of a new one in the world's history.

A large question is beginning to take shape in the mental background of every thinking American: what brand of economic policies will dominate American living conditions when the war is over, when the uniforms have been hung away and the erstwhile soldiers have rejoined the ranks of salesmen, mechanics, and business men?

Will the cloud of government paternalism continue to overshadow us when the factories are turning out peace-time products and there is plenty of food, gasoline, tires, and other necessities, or will we walk again in the sunshine of freedom of thought, action, and enterprise? Will the government continue to tell manufacturers what they can make, and allot materials on a basis of priorities, or will the manufacturer be free to make whatever he thinks there is a demand for, and buy his materials in the open market?

Will the government continue building power plants, selling electric current at prices with which power companies cannot compete and forcing the taxpayers to make up the difference? Will the government continue to set up all sorts of charity services for the "submerged tenth," forcing the more competent or industrious taxpayer to contribute whether he favors them or not? Will our government continue to encroach on the freedom of the individual and the business firm until we run into government wherever we turn?

German, Italian and Japanese troops have been trained for the present war from their earliest childhoods, but American boys, trained only since the beginning of the present crisis, have proved superior in every phase of warfare. The answer is the American Spirit—a spirit which can only develop in an atmosphere of liberty and freedom. More and more government will mean more and more taxes and more interference in private lives, with less and less freedom. When this war is over let us see to it that the government restricts its activities to the job of governing, so that the American Spirit may continue to flourish and keep us a great and happy nation.

Howard Campbell

Friction

AND IT BURNS!



Friction

makes a Dead Center
burn too . . .

often ruining the work
as well as the center



MOTOR TOOL

Ball and Roller Bearing

LIVE CENTERS

reduce friction to
a negligible degree



MOTOR TOOL MANUFACTURING CO.

METAL CUTTING TOOLS

7771 CORTLAND AVENUE • DETROIT, MICHIGAN

*Make it a Rule
to Call Motor Tool*

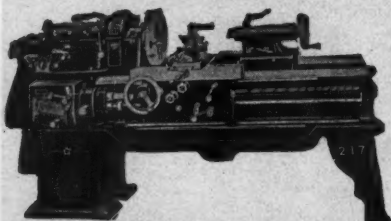
CINCINNATI

QUICK-CHANGE
GEARED-HEAD
MOTOR-DRIVEN

LATHES

Guaranteed for Workmanship, Materials and Performance

They need no introduction to experienced machine shop men. Their many exclusive features enable the operator to reduce operating expenses and more than earn their cost in a short time. Our close co-operation with many of the leading plants everywhere has helped solve perplexing lathe problems for boring, turning or chasing any metal work always most economically.



Latest catalog contains detailed specifications on 14", 16", 18", 20", 22", 24", 27" and 30" sizes. With them are obtainable 32 to 96 changes of thread and feed; 12 to 24 spindle speeds by simply lifting the lever to cover every shop requirement. Whether in tool room or manufacturing plants, CINCINNATI LATHES give most remarkable performance.

Designed and produced by specialists since 1906.

THE CINCINNATI LATHE & TOOL CO.

MARBURG AVENUE,
OAKLEY, CINCINNATI, OHIO



C-F POSITIONERS *are Universal Tools*

C-F Positioners cut welding time as much as 60%, reduce handling time to a fraction, assure uniformly stronger, smoother welds, and greatly increase out-put per man.

With C-F POSITIONERS you can not only speed-up today's war production, but will be fooled-up to meet after-the-war competition, because each C-F POSITIONER is

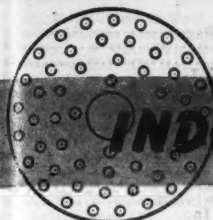
a universal tool—is pedestal mounted to give maximum clearance from all sides, is adjustable for height, rotates 360° and tilts to 135° beyond horizontal . . . gives "a thousand different set-ups" at the push of a button or turn of a hand wheel. Six types, capacities to 30,000 pounds manually operated, motor driven or with variable speed drive for hand or automatic welding. Write for Bulletin WP 22.

CULLEN-FRIESTEDT CO.

1311 S. KILBOURN AVE.

CHICAGO, ILLINOIS

Abart
Abrab
Abrab
Abrab
Abrab
Ame
Ame
Ame
Aron
Advan
Aget-
Air R
Air-W
Albert
Aico
Allen
Almon
Ameri
The
Ameri
Ameri
Ameri
Ameri
Ameri
Ameri
Ameri
Ameri
Ameri
Ames
Anders
Apex
Archer
Arguto
Armstr
Armstr
Armstr
Atlanti
Auto
Autom
Auto
Auto-C
Avey
Bakew
Barnes
Bartelt
Bath &
Baumb
Bay St
Behr-M
Berkele
Bealy
Billings
Black
Blanch
Bodine
Boice-C
Bokum
Boyar-S
Boye &
Bradfor
Brady-I
Brewste
Bridgep
Bristol



INDEX TO ADVERTISEMENTS

Ahart Gear & Machine Co.	344
Abrasive Co.	110
Abrasive Dressing Tool Co.	265
Abrasive Machine Tool Co.	6
Abrasive Products, Inc.	27
Acme Diamond Tool Co.	288
Acme Industrial Co.	232
Acme Tool Co.	301
Acromark Co., The	342
Advance Machine Works	298
Aget-Detroit Manufacturing Co.	212, 352
Air Reduction Sales Co.	311
Air-Way Pump & Equipment Co.	302
Albertson & Co., Inc.	207
Alco Tool Co., The	44
Allen Gauge & Tool Co.	343
Almond Manufacturing Co., T. R.	368
American Metal Hose Branch, The American Brass Co.	169
American Broach & Machine Co.	131
American Cutter & Eng. Corp.	98
American Emery Wheel Works	21
American Gauge Co.	305
American Measuring Instruments Corp.	318
American Metal Works, Inc.	376
American Pipe Bending Machine Co., Inc.	240
American Saw & Mfg. Co.	140
American Screw Co.	151
American Swiss File & Tool Co.	366
American Tool Works Co.	132
Amen Co., B. C.	299
Anderson Bros. Mfg. Co.	341
Apex Machine & Tool Co.	95
Archer & Smith, Ltd.	287
Arguto Oilless Bearing Co.	212
Armstrong-Blum Mfg. Co.	197
Armstrong-Bray & Co.	350, 353
Armstrong Bros. Tool Co.	116
Atlantic Saw Mfg. Co.	308
Auto Engraver Co.	331
Automatic Machine & Tool Co.	50
Automotive Maintenance Machinery Co.	91
Auto Moulding & Mfg. Co.	329
Auto-Ordnance Corporation	249
Avey Drilling Machine Co.	22
Bakewell Manufacturing Co.	70
Barnes Co., Inc., W. O.	241
Bartelt Engineering Co.	351
Bath & Co., Inc., John	141
Baumbach Manufacturing Co., E. A.	335
Bay State Abrasive Products Co.	225
Behr-Manning Corporation	185
Berkeley Equipment Co.	386
Bealy & Co., Charles H.	16
Billings & Spencer Co.	368
Black Diamond Saw & Machine Works, Inc.	355
Blanchard Machine Co.	113
Bodine Corporation, The	51
Boice-Crane Co.	247
Bokum Tool Co., Inc.	367
Boyar-Schultz Corporation	333
Boye & Emmes Machine Tool Co.	208
Bradford Machine Tool Co.	108
Brady-Penrod, Incorporated	296
Brewster-Squires Co.	337
Bridgeport Safety Emery Wheel Co., Inc.	258
Bristol Co., The	151

Brown & Sharpe Mfg. Co.	73
Brown Corporation, W. R.	64
Brown Engineering Co.	324, 329
Bryant Chucking Grinder Co.	167
Buffalo Forge Co.	30
Builders' Iron Foundry	325
Bullard Co., The	204
Bunting Brass & Bronze Co.	23
Burke Machine Tool Co.	146
Capewell Manufacturing Co.	321
Carboloy Co., Inc.	114
Carborundum Co., The	251
Carroll-Jameson Machine Tool Co.	339
Carson-Newton Co.	238
Central Screw Co.	151
Cerro de Pasco Copper Corporation	135
Challenge Machinery Co.	101
Champion Diamond Co.	342
Chandler Products Corp.	151
Chicago Pneumatic Tool Co.	35
Chicago Rawhide Mfg. Co.	337
Chicago Tool & Engineering Co.	319
Chicago Wheel & Mfg. Co.	152, 153
Cincinnati Bickford Tool Co.	127
Cincinnati Electrical Tool Co.	404
Cincinnati Gear Co.	206
Cincinnati Grinders Incorporated	8, 9
Cincinnati Lathe & Tool Co.	400
Cincinnati Milling Machine Co., The	8, 9
Cincinnati Planer Co.	4
Cincinnati Shaper Co.	129
Cincinnati Tool Co.	350
Circular Tool Co., Inc.	283
Cities Service Oil Co.	52
Clark Jr. Electric Co., James	215
Clark Instrument, Inc.	271
Cleveland Pneumatic Tool Co.	47
Cleveland Punch & Shear Works Co.	197
Cleveland Tool Eng. Co.	102
Cleveland Twist Drill Co.	179
Colborne Manufacturing Co.	246
Colonial Broach Co.	243
Colonial Bushings, Inc.	359
Colwell, S. G.	331
Commercial Centerless Grinding Co.	250
Cone Automatic Machine Co.	65
Continental Machines, Inc.	41
Continental Screw Co.	151
Corbin Screw Corp., The	151
Cortland Grinding Wheels Corp.	53
Coulter Machine Co., James	54
Covel-Hanchett Co.	53
Covel Manufacturing Co.	32
Cratex Manufacturing Co.	356
Criterion Machine Works	324, 272, 339
Cross Gear & Machine Co.	147
Cullen-Friestedt Co.	400
Cullman Wheel Co.	162
Danly Machine Specialties, Inc.	359
Davis Keyseater Co.	355
Dayton Safety Ladder Co.	353
Dearborn Gage Co.	80
Delta Manufacturing Co.	389
DeMoss & Son, W. S.	353
Desmond-Stephan Mfg. Co.	262
Detroit Bevel Gear Co.	321
Detroit Broach Co., Inc.	57

Detroit Die Set Corporation.....	82
Detroit Power Screwdriver Co.....	315
Detroit Stamping Co.....	325
Diamond Saw Works, Inc.....	244
Diamond Tool Co.....	321
Dickerman Mfg. Co., H. E.....	210
Dix Manufacturing Co.....	230
Dixon Crucible Co., Joseph.....	229
Dorman Machine Tool Works.....	244
Douglas Machinery Co., Inc.....	87, 275
Dreis & Krump Manufacturing Co.....	220
Dykem Co., The.....	170
Eastern Precision Gage Co.....	286
Empire Tool Co.....	330
Enco Manufacturing Co.....	372
Erickson Steel Co.....	351
Ettco Tool Co., Inc.....	36
Everede Tool Co.....	266
Ex-Cell-O Corporation.....	24
F. & H. Manufacturing Co.....	264
F. & M. Sales Co.....	264
Falcon Tool Co.....	370
Fanco Machine Co.....	317
Farrel-Birmingham Co., Inc.....	5
Federal Products Corporation.....	295
Fell Co., Wm. B.....	286
Fellows Gear Shaper Co.....	11
Ferracute Machine Co.....	323
Fild Abrasive Specialty Mfg. Co.....	341
Firth-Sterling Steel Co.....	29
Fischer Machine Co.....	180
Flexrock Co.....	320
Flynn Mfg. Co.....	304
Foot-Burt Co.....	259
Ford Manufacturing Co., M. A.....	255
Ford Motor Co., Johansson Div.....	100
Fosdick Machine Tool Co.....	14
Fray Machine Tool Co.....	331
Fulvio Specialties Co., Inc.....	253
Gallmeier & Livingston Co.....	113
Gammone-Hauglund Co.....	359
Gear Specialties, Incorporated.....	352
General Electric Co., Lamp Dept.....	173
General Engineering & Mfg. Co.....	315
General Machinery Corporation.....	310
General Manufacturing Co.....	369
Geometric Tool Co.....	84
Glenn & Anholt Tool Co.....	272
Gilbert & Barker Mfg. Co.....	362
Gisholt Machine Co.....	45
Given Machinery Co.....	279
Graham & Co., Inc., John H.....	257
Graham Mfg. Co., Inc.....	333, 243
Grand Specialties Co.....	356
Grant Mfg. & Machine Co.....	323
Gray Machine Co.....	259
Gray-Mills Co.....	49
Greenfield Tap & Die Corporation.....	209
Grob Brothers.....	346
Grobet File Co. of America.....	93, 377
Gwilliam Co.....	186
Hall Manufacturing Co.....	217
Hammond Machinery Builders, Inc.....	330
Hanna Engineering Works.....	137
Hannifin Manufacturing Co.....	137
Hardinge Brothers, Inc.....	137
Harper Co., The H. M.....	151
Hartford Special Machinery Co.....	206
Haskins Co., R. G.....	55
Heald Machine Co.....	2
Heilmann Manufacturing Co.....	325
Hevi Duty Electric Co.....	42
Hilliard Corporation.....	325
Hisey-Wolf Machine Co.....	291
Hjorth Lathe & Tool Co.....	138
Holo-Krome Screw Corporation.....	Fourth Cover
Howe & Son.....	323
Huron Machine Products.....	335
Ideal Commutator Dresser Co.....	373
Illinois Testing Laboratories, Inc.....	272
Independent Pneumatic Tool Co.....	63
Industrial Products Suppliers.....	308
International Nickel Co., Inc.....	193, 194

International Screw Co.....	151
Invincible Tool Co.....	198
Jansson Gage Co.....	350
Jarvis Co., The Charles L.....	19
Jefferson Machine Tool Co.....	40
Johnson Bronze Co.....	181
Johnson Co., W. E.....	237
Johnson Gas Appliance Co.....	239
Johnson Manufacturing Corp.....	66
Johnson Tool Co., Inc.....	264
Jones & Lamson Machine Co.....	37, 189
Kalamazoo T. & S. Co.....	48
Kar Engineering Co., Inc.....	218
Kearney & Trecker Corporation.....	17
Kempsmith Machine Co.....	25
Kennametal, Inc.....	187
Knight Machinery Co., W. B.....	10
Kobel Diamond Tool Co.....	353
L-W Chuck Co.....	376
Lamson & Sessions Co., The.....	151
Landis Machine Co.....	2
Landis Tool Co.....	12, 13
Leach Machinery Co., H.....	228
LeBlond Machine Tool Co., The R. K.....	Third Cover
Lee Co., K. O.....	199
Lehmann Machine Co.....	77
Leiman Bros. Co.....	344
LeMaire Tool & Mfg. Co.....	332
Lemco.....	379
Lewis Machine Tool Co.....	334
Lewthwaite Machine Co., T. H.....	260
Liberty Tool & Gage Works.....	46
Lima Electric Motor Co.....	185
Lincoln Electric Co.....	337
Lincoln Park Tool & Gage Co.....	333
Lipe-Rollway Corporation.....	59
Littleford Bros., Inc.....	346
Logansport Machine, Incorporated, Second Cover.....	254
Lucas & Son, Inc., J. L.....	256
Luers, J. Milton.....	254
Lufkin Rule Co.....	214
Luma Electric Equipment Co.....	351
Lynn Manufacturing Co.....	328
McCrosky Tool Corp.....	154
Machinery Manufacturing Co.....	103, 232, 266
Madison-Kipp Corporation.....	242
Marquette Manufacturing Co.....	341
Martin Machine Works, J. E.....	186
Masonite Corporation.....	233
Master Electric Co.....	333
Industrial Equipment Division.....	333
Matthews & Co., James H.....	58
Mattison Machine Works.....	62
Mead Specialties Co.....	224, 390
Mechanical Die & Tool Co., Inc.....	355
Metal Carbides Corporation.....	345
Metal Cutting Tools & Mfg. Co.....	378
Meyers Co., Inc., W. E.....	374
Michigan Chrome & Chemical Co.....	284
Michigan Tool Co.....	212
Mid-West Abrasive Co.....	94
Millers Falls Co.....	235
Minnesota Mining & Mfg. Co.....	223
Mixing Equipment Co., Inc.....	374
Modern Collet & Machine Co.....	79
Monarch Machine Tool Co.....	60, 61
Morey Machinery Co.....	357
Morse Tool Co.....	397
Morse Twist Drill & Machine Co.....	159
Morton Manufacturing Co.....	300
Motor Tool Manufacturing Co.....	399
Mummert-Dixon Co.....	260
Murchey Machine & Tool Co.....	175
Murray Mfg. Co., D. J.....	317
National Acme Co.....	61
National Broach & Machine Co.....	211
National Screw & Mfg. Co., The.....	251
National Twist Drill & Tool Co.....	181
Nebel Machine Tool Co.....	183
New England Carbide Tool Co.....	163
New England Screw Co.....	151
New Method Steel Stamps, Inc.....	259

Niagara.....	
Nichols.....	
Nichols.....	
Nichols.....	
Nielsen.....	
Norma.....	
North.....	
Northern.....	
Norton.....	
Numbers.....	
Ohio M.....	
Oliver M.....	
O'Neill.....	
Owston.....	
Paddock.....	
Parker.....	
Parker.....	
Pawtuck.....	
Penny.....	
Perfor.....	
Perfex.....	
Phell H.....	
Phillips.....	
Pittsbur.....	
Plan-O.....	
Plomb.....	
Porter-C.....	
Pratt &.....	
Divis.....	
Prels E.....	
Procut.....	
Product.....	
Progres.....	
Prosser.....	
Putnam.....	
Quality.....	
Quality.....	
Reading.....	
Reading.....	
Ready.....	
Refinerr.....	
Reich.....	
Remco.....	
Reynold.....	
Rickert.....	
Rivett.....	
Robbins.....	
Roberts.....	
Robert.....	
Rockfor.....	
Rockfor.....	
Rogers.....	
Rotary.....	
Rotor.....	
Rusnok.....	
Russell.....	
Ruthm.....	
S & S.....	
Savage.....	
Sav-W.....	
Scherr.....	
Schmidt.....	
Schultz.....	
Sevill.....	
Scully.....	
Seneca.....	
Services.....	
Severan.....	
Shakepi.....	
Sheldon.....	
Simmon.....	
Simond.....	
Sincinai.....	
Skillsaw.....	
Smit &.....	
Smith &.....	
Smith &.....	
Snap-O.....	
Sommer.....	
Sonnen.....	
South.....	
Southi.....	

Niagara Machine & Tool Works.....	284
Nichols-Morris Corporation	278
Nicholson & Co., W. H.	314
Nicholson File Co.	145
Nielsen Tool & Die Co.	266
Norma-Hoffmann Bearings Corp.	99
North Bros. Manufacturing Corp.	71
Northern Engineering Works.....	39
Norton Co.	302, 303
Numberall Stamp & Tool Co., Inc.	329
Ohio Machine Tool Co.	26
Oliver Instrument Co., Inc.	319
O'Neill-Irwin Manufacturing Co.	319
Owatonna Tool Co.	109
Paddock Tool Co.	306
Parker Co., The Charlies.....	151, 320
Parker-Kalon Corporation	151, 269
Pawtucket Screw Co.	151
Pellow Machine Co.	330
Penrod & Sons Tool & Eng. Co., Floyd.....	247
Perfex Gage & Tool Co.	125
Pheoli Manufacturing Co.	151
Phillips Screw Manufacturers.....	151
Pittsburgh Stamp Co., Inc.	236
Plan-O-Mill Corporation	74
Plomb Tool Co.	90
Porter-Cable Machine Co.	68, 290
Pratt & Whitney	
Division Niles-Bement-Pond Co.	307
Preis Engraving Machine Co., H. P.	353
Procuter Safety Chuck Co.	336
Production Machine Co.	347
Produce Machine Co.	88
Progressive Tool & Cutter Co.	370
Prosser & Son, Thomas.....	31
Putnam Tool Co.	69
Quality Tool & Die Co.	289
Quality Tool Works.....	242
Reading Machine Co.	136
Reading Screw Co.	151
Ready Tool Co.	245
Refiners Lubricating Co.	324
Reich Mfg. Co., J. R.	286
Remance Products Corporation	286
Reynolds Machinery Co.	158
Rickert-Shafer Co.	111
Rivett Lathe & Grinder Inc.	7
Robbins Engineering Co.	357
Roberts Rubber Co., Weldon.....	191
Robertson Machine & Foundry Co., W.	284
Rockford Drilling Machine Co.	312
Rockford Machine Tool Co.	89
Rogers Tool Corporation, John M.	282
Rotary File Co., The.....	245
Rotor Tool Co.	149
Rusnok Tool Works	200
Russell Burdall & Ward Bolt & Nut Co.	151
Ruthman Machinery Co.	66
S & S Machine Works.....	182
Savage Co., W. J.	252
Sav-Way Industries	85
Scherr Co., Inc., George.....	161
Schmidt, Inc., Geo. T.	172, 340, 383
Schultz & Anderson Co.	35, 281
Scovill Manufacturing Co.	151
Scully-Jones & Co.	309
Seneca Falls Machine Co.	23
Services Directory	294, 393
Severance Tool Industries, Inc.	383
Shakeproof Inc.	151
Sheldon Machine Co., Inc.	221
Simmons Machine Tool Corp.	15
Simonds Saw & Steel Co.	171
Sinclair Refining Co.	155
Skillsaw, Incorporated	195
Smit & Sons, Inc., J. K.	226
Smith & Co., D. A.	338
Smith Tool & Engineering Co.	210
Snap-On Tools Corporation.....	297
Sommer & Adams Co.	105
Sosner Tool & Machine Works, Inc.	276, 277
South Bend Lathe Works.....	143
Southington Hardware Mfg. Co., The.....	151

Spartan Saw Works, Inc.	336
Springfield Machine Tool Co.	96
Square Surface Plate & Tool Co.	236
Stackbin Corporation	205
Standard Electrical Tool Co.	106
Standard Gage Co., Inc.	261
Standard Marble Works, Inc.	333
Standard Pressed Steel Co.	15, 316
Star Electric Motor Co.	235
Starrett Co., The L. S.	75
Stevens, Inc., John B.	333
Stevens Walden, Incorporated.....	394
Strad Manufacturing Co.	173
Strong, Carlisle & Hammond Co.	357
Sturdimatic Tool Co.	374
Sturtevant Co., P. A.	313
Sunnen Products Co.	34
Sun Oil Co.	287
Surface Combustion Corporation,	
Heat Treatment Division	33
Swanson Tool & Machine Corp.	246
Synco Devices, Inc.	92
Taft-Peirce Mfg. Co.	292
Tammis Silica Co.	302
Tannewitz Works	67
Taylor Machine Co.	238
Templeton, Kenly & Co.	319
Texas Co., The	219
Threadwell Tap & Die Co.	304
Timken Roller Bearing Co.	1
Tomkins-Johnson Co.	267
Tool Engineering Service Co.	190
Trig-Easy, E. H. Needham.....	177
Triplex Machine Tool Corp.	150
Troyke, Alfred A.	337
Tru-Cut Tool Co.	245
Tungsten Electric Corporation	373
Turner Machinery Co.	351
Udylite Corporation	97
Union Twist Drill Co.	261
Union Twist Drill Co., Butterfield Division,	142
United States Drill Head Co.	327
United States Electrical Tool Co.	293
United States Steel Supply Co.	139
V & O Press Co.	316
Vard, Incorporated	331
Vascoloy-Ramet Corporation	30
Victor Machinery Exchange, Inc.	391, 393
Vimco Manufacturing Co.	344
Vinco Corporation	353
Walker Co., Inc., O. S.	174
Walker-Turner Co., Inc.	371
Walls Sales Corporation	354
Waltham Machine Works.....	355
Wardwell Mfg. Co.	340
Warren Industries	303
Watts Bros. Tool Works.....	200
Waverly Petroleum Products Co.	334
Webber Gage Co.	253
Webber Machine Corp.	292
Weldon Tool Co.	26
Wells Manufacturing Corporation.....	239
Wesson Co.	239
Westcott Chuck Co., Inc.	133
Western Tool & Mfg. Co.	312
Westinghouse Electric & Mfg. Co.	345, 349
Westlor Tool & Die Co.	280
Wetmore Reamer Co.	335
Wheelock, Lovejoy & Co., Inc.	248
Wheel Trueing Tool Co.	78
Whipple Manufacturing Co.	357
White & Bagley Co.	76
Whitney Metal Tool Co.	347
Whitney Screw Corp.	151
Wiedemann Machine Co.	73
Willey's Carbide Tool Co.	196
Williams & Co., J. H.	43
Wilson, K. R.	85
Wilson Mechanical Instrument Co., First Cover	104
Winter Bros. Co.	194
Zeh & Hahnemann Co.	250
Ziegler Tool Co., W. M.	343



For Want of a Nail . . .

It's true that sharp tools cut production costs. But efficiency slumps when the same tools that put sharp edges on cutting tools spew out abrasive grit and dust to attack close-fitting parts of costly machinery.

For want of a nail, a shoe was lost. For want of a way to halt the attacks of grit and dust on machinery—and on workers' lungs, too—vital production can suffer.

The Cincinnati Air Master — easily cleaned, easily installed and built in three sizes to fit all grinders and buffers—will solve this problem by trapping grit and dust at their source. Write for complete information.



The Cincinnati

ELECTRIC DRILLS • GRINDERS • BUFFERS • PORTABLE TOOLS

The Cincinnati Electrical Tool Co.

DIVISION OF THE R. K. L. BLOND MACHINE TOOL CO., CINCINNATI, OHIO

3809-9

MADISON ROAD



The Birth of Precision

any schoolboy can tell you what Eli Whitney did for
 American agriculture with his cotton gin. But did you
 know that this pioneer Yankee craftsman might properly
 be called the father of modern precision manufacture?

A financial failure of the cotton gin sent Whitney's American
 ingenuity to work on the manufacture of muskets.
 At that time, each gun and every one of its separate
 parts were individually shaped. No two parts were alike.
 If one piece was damaged, a gunsmith shaped a new
 one from raw stock and filed it until it fitted.

Whitney was the first to make each part exactly like the
 similar part for other guns and he proved his point by
 taking ten pieces of each part of a musket to Washington
 with him when he went in quest of a government contract.
 While bewildered officials looked on in amazement, he
 picked parts at random from the heap and put together
 ten muskets. Incidentally, he won a contract.

We say incidentally, because what Whitney did that
 day in 1798 gave birth to modern precision—the same
 precision that is found today in the manufacture of
 LeBLOND LATHES. Now, 145 years after Whitney's his-
 toric trip to his nation's capital, that same precision is a
 major factor in winning the war.

THE R. K. LeBLOND MACHINE TOOL CO. • CINCINNATI, OHIO

Largest Manufacturer of a Complete Line of Lathes

THE BETTER FASTENING METHOD

*Completely
Cold Forged*



GUARANTEED
Unfailing PERFORMANCE

HOLO-KROM

fibro forged TRADE MARK **SOCKET SCREW**

THE HOLO-KROME SCREW CORP. HARTFORD 10, CONN., U.S.A.

MODERN Machine Shop



TODAY—"on land, at sea and in the air", on fighting fronts and production lines—**NORMA-HOFFMANN PRECISION BEARINGS** are contributing to the Victory that will clear away the clouds of war.

TOMORROW—bettered by the added skill and experience gained in war-time—they will be equally instrumental in solving the problems of design and production of a world at peace.

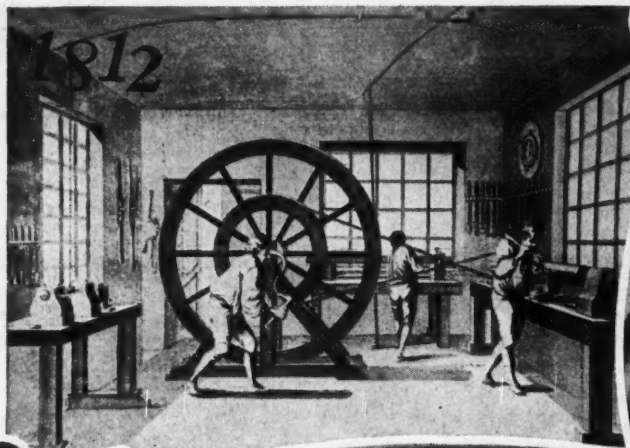
Let our engineers work with you, NOW.

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U.S.A. FOUNDED 1911

PRECISION BALL, ROLLER AND THRUST BEARINGS

TO WIN THE WAR—Work—Fight—Buy War Bonds!

Just imagine / production then



Beitmann Archive

BETWEEN 1798 and 1812 Eli Whitney greatly improved the making of fire arms. Introducing new mechanical equipment, such as the lathe illustrated above, he was able to manufacture interchangeable parts for rifles for the U. S. Army. A model musket was copied with precision, so that every piece was exactly like every other among thousands. When all parts were assembled, they united as a musket far superior to an arm produced by any other method . . . and production was on a schedule never before attempted. But, compared by the stand-

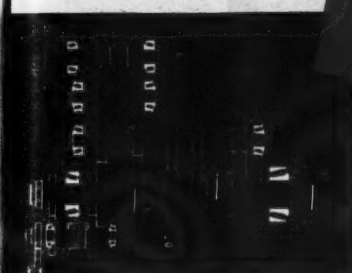
ards of today, Eli Whitney's production was negligible. And what was the greatest single improvement over his methods? Perhaps it was the advancement in the use of air and hydraulics . . . the applying of air or hydraulic pressure for the operation of chucks, work holding and ejecting devices, stamping and assembling presses and many other labor saving devices.

Let "Logan" Engineers make recommendations on modernizing the equipment in your plant by the application of Air and Hydraulic equipment.

LOGANSPORT MACHINE, INCORPORATED
 901 MAYSON ROAD LOGANSPORT, INDIANA
 Manufacturers of Air and Hydraulic Equipment, Chucks, Cylinders, Valves, Pumps and Accessories

The her
 of the
 engine
 precision
 complet
 tapered
 means
 ment of
 the assu

en



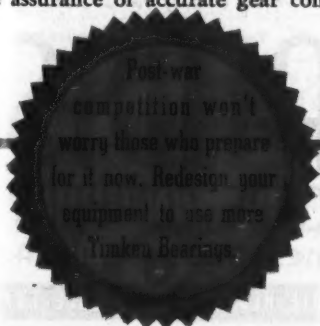
The herringbone geared headstock of the Sidney 18" x 10" 16-speed engine lathe is a good example of precision design carried through to completeness by the use of Timken Tapered Roller Bearings on all shafts.

It means correct and constant alignment of every shaft and as a result, the assurance of accurate gear con-

tacts from power input to spindle nose. The shafts also are fully protected against radial, thrust and combined loads; and gears have greater stability.

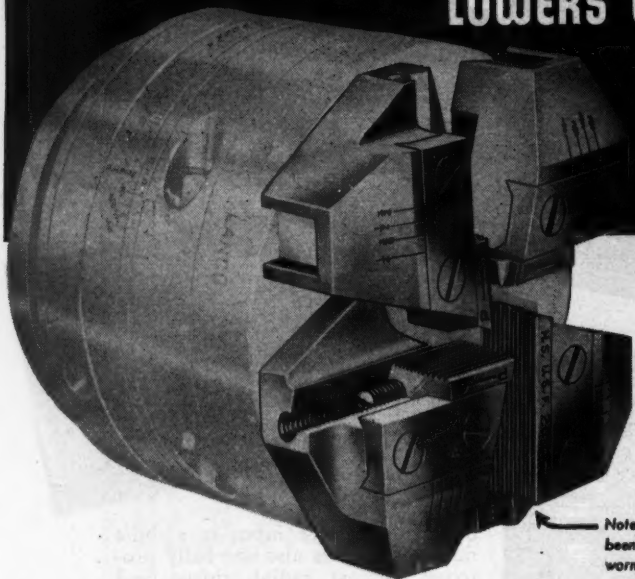
There is, furthermore, a definite saving of power through the elimination of friction at all bearing points and a radical reduction of maintenance through the prevention of shaft and bearing wear.

Mounting the spindle alone on Timken Bearings is an important factor of precision in any machine, but their full use as shown in the Sidney Machine Tool Company's design is very desirable. The Timken Roller Bearing Company, Canton, Ohio.



TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

INTERCHANGEABILITY OF LANDIS CHASERS LOWERS OPERATING COSTS



Note the full length chaser which has been inserted with three practically worn-out chasers to complete the set

12 Features of the LANDIS TANGENTIAL CHASER

- 1-Permanent throat permits close to shoulder threading throughout life of chasers
- 2-Rake angle range covers all machineable materials
- 3-Free cutting condition permits maximum cutting speeds
- 4-Simple grinding operation renews entire cutting edge and leading feature
- 5-Line contact with work lessens friction and minimizes thread distortion
- 6-Leading feature insures thread of accurate lead
- 7-Lateral absorption of cutting strain reduces vibration and chaser breakage
- 8-Right and left hand threading feature reduces chaser equipment
- 9-Standard chasers thread all diameters with proper chaser holders
- 10-Interchangeability of chasers lowers operating cost
- 11-Chaser length provides exceptionally long life and low tool cost
- 12-Permanent throat gives equal distribution of cut

EACH LANDIS CHASER IS AN INDEPENDENT UNIT

Whenever a Landis chaser is worn or damaged it can be reground or replaced without affecting the remaining chasers of the set. Each chaser is entirely independent of the other. New ones are substituted as needed, as long as the pitch, thread form, and throat remain the same, thereby insuring low operating cost.

The Finest Thread Cutting Tool in Industry

LANDIS
MACHINE COMPANY
WAYNESBORO, PA., U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

Too

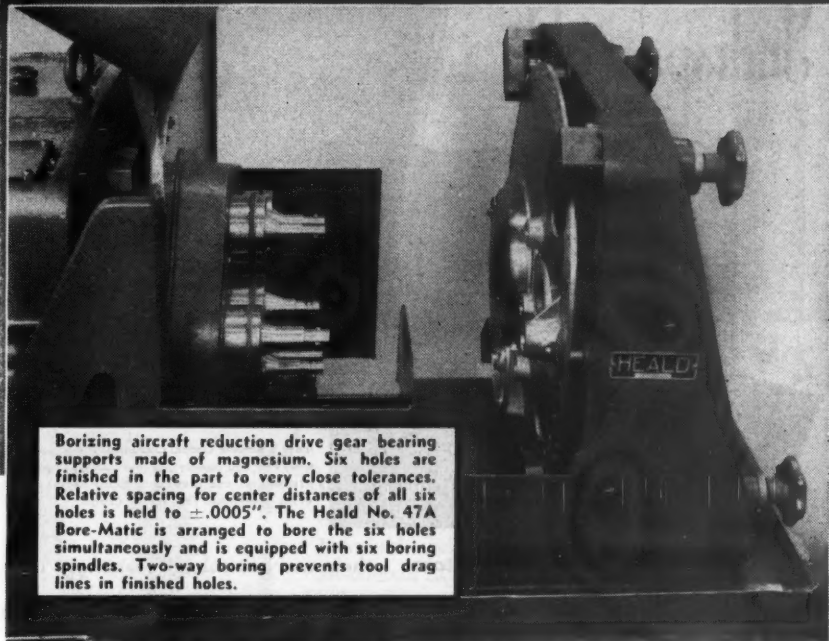
In a
bori
met
mea
how
at m
ture
ing
The
deve
impe
able
this

e Head

For

The Solution

TO MACHINING POST-WAR LIGHT METALS



Borizing aircraft reduction drive gear bearing supports made of magnesium. Six holes are finished in the part to very close tolerances. Relative spacing for center distances of all six holes is held to $\pm .0005"$. The Heald No. 47A Bore-Matic is arranged to bore the six holes simultaneously and is equipped with six boring spindles. Two-way boring prevents tool drag lines in finished holes.

Today's precision **BORIZING** of Aircraft Parts

In aircraft plants, everywhere, Heald Bore-Matics are boring, turning, facing and grooving hundreds of light metal parts to precision tolerances . . . with a finish measured in micro-inches. The same Heald "know-how" that gave the aircraft industry precision finished at mass production speeds will give post-war manufacturers maximum precision and production in machining light metal alloys.

The same engineering organization that designed and developed means and methods for accomplishing the impossible on complicated war time products are available to you for today or tomorrow's problems. Make this department part of your organization.

Heald Machine Company Worcester, Mass., U.S.A.

Partial List of BORIZED Parts

Bases	Magneto
Bearing	Housings
Housings	Oil Pump
Camshaft	Bodies
Housings	Propeller Shaft
Covers	Plugs
Cylinder Heads	Reduction Gear
Crankcase	Cases
Sections	Regulator
Front Covers	Housings
Gear Boxes	Speed Reducer
Gun Turret	Housings
Saddles	Supercharger
Gyro Pilot	Gear Casings
Servo Bodies	Valve Housings
Instrument	Valve Tappet
End Shields	Guides

For More Precision Faster bring your problems to Heald

Indispensable

COURTESY WESTMOUNT TOOL WORKS, QUEBEC, CANADA



Jones & Lamson Optical Comparators are used to inspect positively and rapidly punches and other products with symmetrical and irregular contours held to close limits, at the Westmount Tool Works, Canada.

Jones & Lamson Optical Comparators are indispensable for the accurate, rapid inspection of irregular contours that are held to close limits. By no other means can they be inspected as positively and as rapidly.

Because of wartime restrictions we cannot illustrate many of the remarkable applications of these **Comparators**, how

their use has solved seemingly impossible inspection problems and helped to speed the production of vital products. But—our inspection engineers are available to study your inspection problems and give you the benefit of more than twenty years' experience, pioneering and developing Inspection by Optical Projection.



JONES & LAMSON

Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies

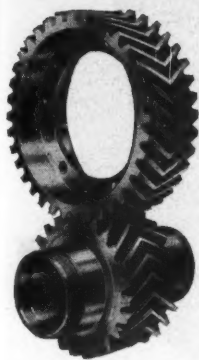
MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.
Profit-producing Machine Tools

RE

There
gear at
every t
for any
enginee
help yo



REDUCTION GEARS FOR THE ARMY'S FLYING CLASSROOMS



There is a Farrel-Sykes gear and gear unit for every type of service and for any capacity. Farrel engineers will be glad to help you solve your gear problems.

Many fledgling bomber crews are today learning the intricacies of precision bombing in this new Fairchild training plane powered by Ranger, air-cooled, inverted, in-line engines.

Reduction gears, for transmitting engine power to propeller at the most efficient speed for operation, are of Farrel-Sykes design... the well-known *Gear with a Backbone*. The distinctive feature of these herringbone gears is their continuous teeth, which give them the "backbone" to meet the need for unfailing service.

Greater effective face width provides extra strength and high load-carrying capacity in small space. Combined characteristics of overlap or interlacing of the teeth, gradual engagement and inclined line of pressure, contribute to smooth, quiet operation and maintenance of correct tooth action throughout the life of the gears.

FARREL-BIRMINGHAM COMPANY, INC.

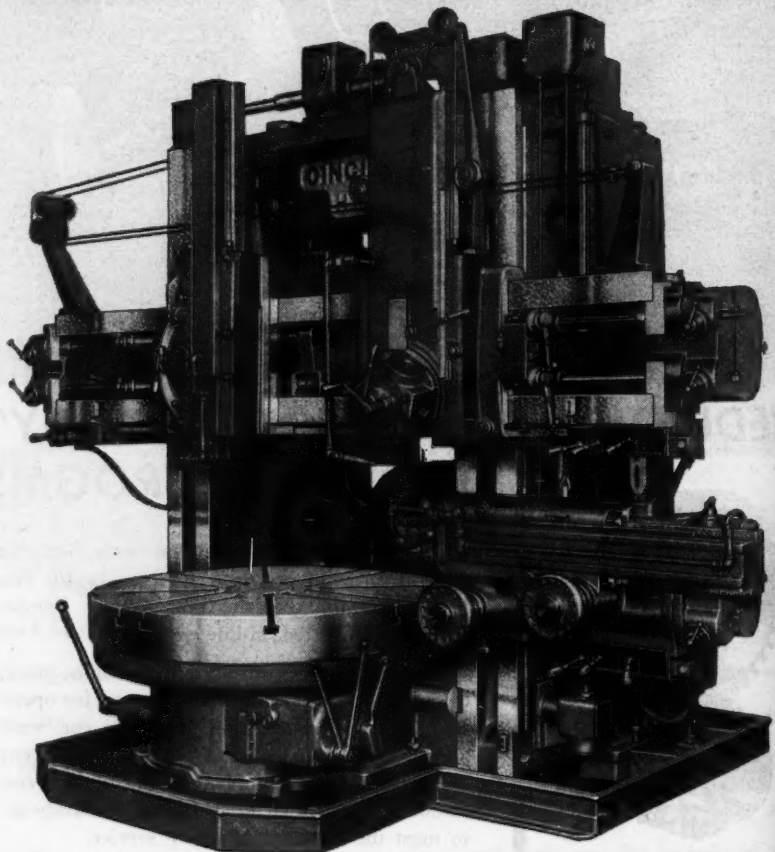
ANSONIA, CONN.

BUFFALO, N. Y.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. -- Branch Offices: New York, Pittsburgh, Akron, Los Angeles



CINCINNATI HYPRO VERTICAL BORING MILLS



● Now available for early delivery—54" and 64" Vertical Boring Mills—with or without turret heads.

Write for descriptive Bulletin No. 130-M.



The CINCINNATI PLANER *Co.*

CINCINNATI

OHIO, U.S.A.

PLANERS • PLANER MILLERS • VERTICAL BORING MILLS

**I'D LIKE TO SEND
A NOTE WITH THIS!**

*I'd say, "Here's a part that's **Fit to Fight!** Install it in a new engine or use it to repair an old one. You'll find that it fits *exactly!* I know, because I machined it . . . to a tolerance of $\pm .0005$ ".*

*"That's what mass production calls for—parts that are accurate . . . identical . . . *inter-changeable!* I get a lot of satisfaction out of doing this precision work on my Gisholt—making every part *fit to fight* for the planes that will help us win this war. And you can bet your sweet life that no Axis craftsman will ever beat me and my Gisholt at it. Good luck. Yours for Victory!"*

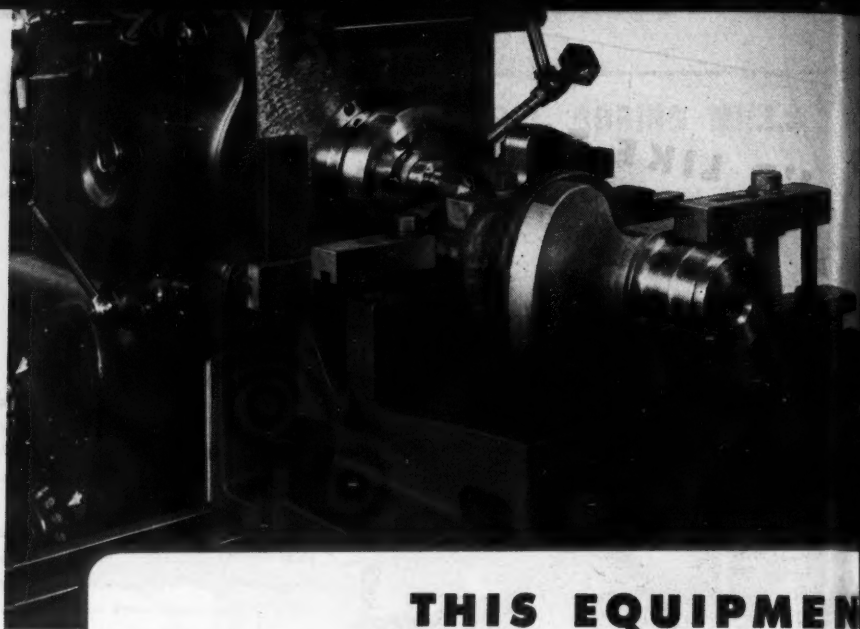
Look Ahead..Keep Ahead..With Gisholt Improvements in Metal Turning

At Gisholt, the Army-Navy "E" and the Treasury Flag fly side by side

GISHOLT MACHINE COMPANY
1219 East Washington Ave. • Madison, Wis.



TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES



THIS EQUIPMENT *In Several*

● The CINCINNATI No. 3 Plain Dial Type Miller and the CINCINNATI engineered fixture—shown in the two illustrations above—team up to handle two distinct milling operations on aircraft crankshafts with a minimum of set-up time.

In the first setting, a 45° clearance is milled for a bearing collar. At the completion of this operation, adjustable fixture elements are rearranged, the cutters changed by means of the quick change collet, the work adjusted to the cutter, and everything's all set for the next operation of milling a 24° angle on one cheek.

Several machine characteristics contribute towards the economical production of these parts: the **right speed** for the type

and
the
effor
cutt
if de
men
rapi
Th
are
gine
prob
offer

THE CINCINNATI MILLING MACHINE CO.

TOOL ROOM AND MANUFACTURING MILLING MACHINES... SURFACE BROACHING MACHINES... CUTTER SHARPENING MACHINES...



REMOVES SET-UP TIME

everyday

and diameter of cutter, quickly selected at the front (or rear, if desired) and without effort . . . the right feed for the material and cutter, quickly selected at the front (or rear, if desired) and without effort . . . rapid adjustment of work to cutter with three way power rapid traverse.

Time-saving teams of fixture and machine are specialties with CINCINNATI Service Engineers. They'll be glad to analyze your milling problems, and you may be sure that they will offer a solution which will please you.



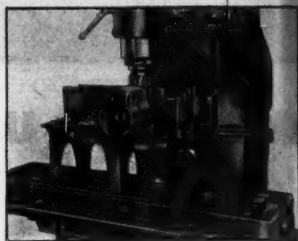
CINCINNATI Universal High-Speed Dial Type Milling Machine. Also built in Plain and Vertical styles.

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

SHARPENING MACHINES . . . CENTER TYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

ACCURACY FROM SIMPLICITY

The Knight Miller's ease and simplicity of operation make for accuracy.



Accurate Boring of Machine Frames Without Jigs or Layout.

The KNIGHT MILLER has an arrangement of a single set of controls governing the action of the machine which is simple, easy and convenient to operate. The large bearing surface on the column is accurately scraped to surface plates, as are the bearing surfaces on the table, saddle and knee. Gears are heat treated, finished and shaved for perfect tooth contour and mounted on short shafts for strength and rigidity. Anti-friction bearings are used to support all shafts and make for ACCURACY.

Write for our catalog.



**W. B. KNIGHT
MACHINERY
COMPANY**

ST. LOUIS
MISSOURI

FELLOWS PRECISION FINISHING

now available for

FINE PITCH SMALL GEARS



Manufacturing executives and production men will welcome the advent of this running mate for the Fellows Fine Pitch Gear Shaper — a new No. 4 Fine Pitch Gear Shaving Machine.

Rotary Gear finishing has so firmly established its place in precision manufacture as to make this new tool "a natural" for every shop which is turning out external spur or helical gears of 4 inches diameter or less.

It embodies means for maintaining super-rigid alignment of work and the finishing tool on which indefinite duplication of highest accuracy depends.

Complete details are available. Write The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Bldg., Detroit, Mich., or 640 West Town Office Bldg., Chicago, Ill.

THE **FELLOWS** GEAR SHAPER
COMPANY

[illegible]

the amount of loading in movement. Each

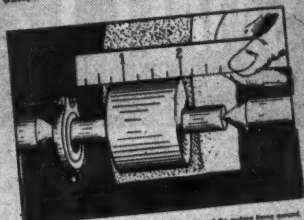
The ideal width of a grinding wheel for any given job is determined by several variable factors. Tied in with correct grinding wheel width are such other considerations as work carriage traverse speed, work speed and wheel speed. All four of these subjects are fully explained in the book "Better Grinding," which may be secured by mailing the coupon at the bottom of the opposite page. Altogether, the book's eighteen chapters make a practical, easy-to-take course on the subject of precision grinding.

Chapter XII

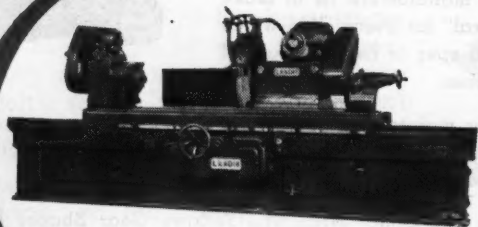
GRINDING WHEEL WIDTH

As last thought the work of the grand
whole story not even important
Quite true a whole story is made to
produce with an economy and with an
good a time it is less a 10" time, a 10"
less a 10" time. But the time required
to do this is an important element and
this time will always be less when a
whole with the largest possible time
which is completed.

the walls of the wheel will therefore be determined by the requirements of the customer part or the lubrication of the machine being used. Where high efficiency is the order of the day there should never be a compromise, however. It is extremely safe to assume that the wheel will be recommended by the user wherever it can give maximum wall to bound the heat. As long as the machine is used for the purposes mentioned above it will be completely maintenance-free in particular.



If there is not a slight amount of overlap on both sides of the sections being ground, they might separate in the depth of the courses in the work and shift the position of the work. The result of this would be a slight ridge on one side.



**THE LANDIS
10" - 14" TYPE C
PLAIN HYDRAULIC
GRINDERS**

• Recommended for the longer shaft and spindle work and for miscellaneous medium size parts requiring a plain machine.

• Used by many war industries—particularly airplane engine and gun manufacturers.

• Both swings available in 18", 36", 48", 72", 96" and 120" lengths.

IF YOU HAVE A GRINDING PROBLEM

Let George do it

LANDIS TOOL COMPANY

George Grindit Says

"When anyone asks me how wide the grinding wheel should be, I am reminded of the classic question: What size pair of trousers will fit an elephant? The answer to both questions is just about the same—it depends. Yes, it depends on the size of the job at hand where grinding wheel size is involved just as it depends on the size of the elephant where the size of the trousers is involved."



THE CHAPTERS

Work Centers and Centers in the Work . . .
Work Drivers and Driving Dogs . . . Work Rests . . .
The Diamond . . . Wheel Dressing and Wheel Truing . . .
Mounting and Balancing the Wheel . . . Grinding Wheel Coolant . . .
Lubrication . . . Multiple V Belt Drives . . .
Wheel Spindles and Bearings . . . Grinding Wheel Feed . . .
Grinding Wheel Width . . . Speed of Work Carriage Traversal . . .
Work Speed . . . Grinding Wheel Speed . . . The Grinding Wheel . . .
Chatter . . . Miscellaneous Bits.

Please Send Me a Free Copy of . . .
"BETTER GRINDING"

NAME

COMPANY

ADDRESS

CITY STATE 12

Please Print Above and Send To
LANDIS TOOL CO.
WAYNESBORO, PENNSYLVANIA

WAYNESBORO, PENNSYLVANIA

SNAGGING WHEELS *Built to "Take it!"*

BAY STATE

BAY STATE

Here are honest-to-goodness reasons why BAY STATE WHEELS last longer and produce a lower grinding cost per ton:

1. CONTROLLED POROSITY (Control over the size and distribution of pore spaces between abrasive particles). . . . Cooler cut, increased wheel life, closer duplication.
2. RESINOID B BOND (Specially designed for High Speed operation). . . . Greater ability to resist heat.
3. VITRIFIED HY BOND (To be used where "A" abrasive (Aluminum Oxide) products are required). . . . A tougher, sturdier bond for severe, Slow Speed operations.
4. VITRIFIED G BOND (Used exclusively with "C" abrasive (Silicon Carbide). . . . A sharp, cooler cutting wheel for snagging cast iron and low tensile strength materials.

Send for Bulletin on this subject.

WHEELS of PROGRESS

BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U. S. A.

SIMMONS

No. 2 TURRET LATHE

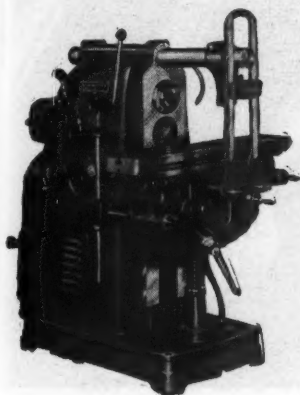
A production standby, the Simmons No. 2 Turret Lathe handles an infinite number of diversified parts with very little special tooling items. Low in cost, it produces close-tolerance work speedily and economically. The MICRO-SPEED Drive offers unlimited speed variations while the spindle is in operation, enabling quick selection of the speed best suited to the work



and cutting tools. Made in Plain and Back-gear types (the latter illustrated). Write **TODAY** for details and delivery dates.

SPECIFICATIONS

Bar Capacity — $1\frac{1}{4}$ ";
Swing Over Bed — 14";
Swing Over Cross-Slide — 6".



SPECIFICATIONS

Speeds — 64-710 R.P.M.;
Range of Feeds — Horizontal —
34", Cross — 8", Vertical — $18\frac{1}{2}$ "

No. 1A MILLING MACHINE

Inexperienced operators quickly learn to produce small, high-precision parts on the Simmons 1A—whether long production runs or small-lot work with frequent set-ups. Through MICRO-SPEED, an infinite number of speed changes can be made while the spindle is in motion by means of the Selector Dial. Write **TODAY** for complete details.

SIMMONS MACHINE TOOL CORPORATION

Main Office: 1745 NORTH BROADWAY, ALBANY 1, N. Y.

New York Office: 149 BROADWAY

SIMMONS

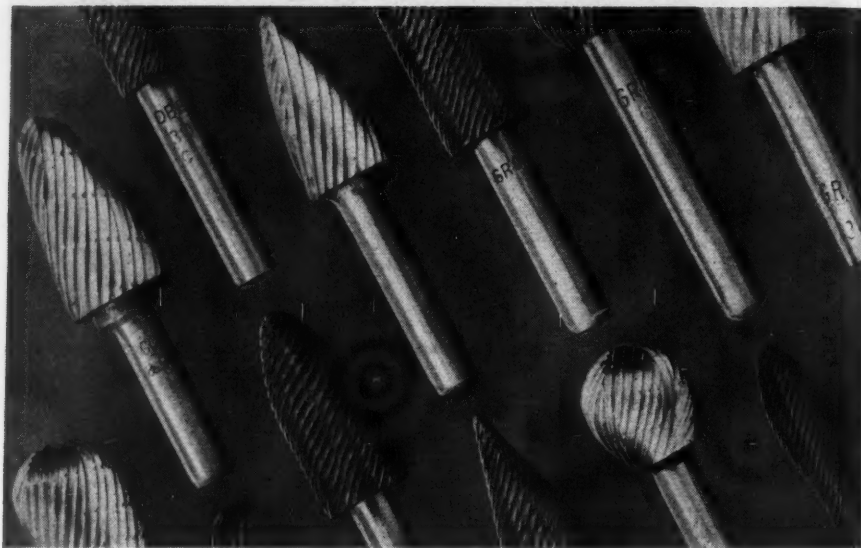
LATHES • TURRET LATHES • MILLERS • PLANERS • 6" BAR BORING MACHINES



Grobet

ROTARY FILES

HAND CUT • GROUND FROM THE SOLID • MILLED CUT



In today's race with time, there can be no substitute for quality. Since the birth of the machine age, "Precision made" has been identified as an inbuilt quality of every Grobet product.

Grobet Rotary Files bite hard at high speeds and their ability to stay sharp is an accepted fact.

Send for Catalog KR, the most complete of its kind, illustrating in full size, hundreds of Rotary Files, hand cut, milled cut, ground cut; also Diesinkers' Burs, Tube Burring Cutters, Chatterless Countersinks, etc.

GROBET FILE CO. of AMERICA

421 Canal Street



New York, N. Y.

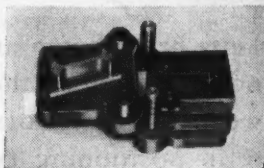
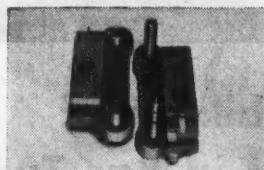
IMPORTERS OF GROBET SWISS FILES

MFRS. OF GROBET ROTARY FILES

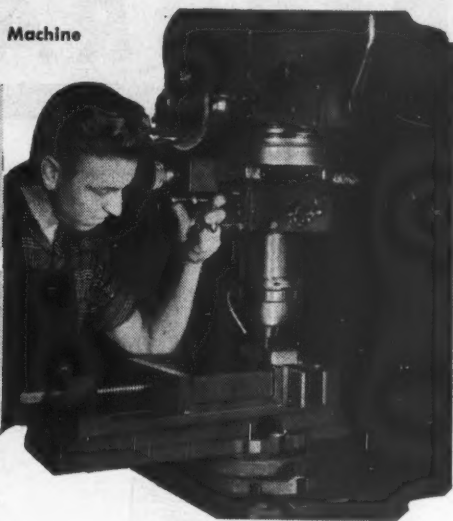
"One of the most Outstanding Machines I've ever seen"

JOHN W. RIX, Mfg. Engineer, Cessna Aircraft Co.

The Milwaukee Rotary Head Milling Machine
"Under Fire" At Cessna



On tools like these no layout was required. All machining was done by working to "dial" graduations. Direct measurements were eliminated.



Proof That This Machine "Has what it takes"

Is Found In Mr. Rix's Statement:

"I consider the Milwaukee Rotary Head Milling Machine to be one of the most outstanding machines I've ever seen for tool room work. It paid for itself in the first few months of operation. We have repeatedly accomplished feats which I would not have believed possible if I had not seen them myself."

(signed) JOHN W. RIX

Since purchasing their first Milwaukee Rotary Head Milling Machine, Cessna Aircraft has milled hundreds of complicated blanking dies of geometrical form. Furthermore, they milled the punches to fit these dies with .001" clearance in between without resorting to hand fitting of any kind.

This meant that the punches and dies were heat-treated at the same time. Then, after surface grinding, they were ready for mounting on the die set.

As a leader in your field you should have the complete story on the Milwaukee Rotary Head Milling Machine and its remarkable, low-cost performance. Write for Bulletin 1002A.

Kearney & Trecker

Products

CORPORATION

Milwaukee, Wisconsin

Subsidiary of Kearney & Trecker Corporation

Rotary Head
Milling Machine

Autometric
Jig Borer

Center Scope

Milwaukee
Face Mill Grinder

Milwaukee
Midgetmill

Milwaukee
Speedmill

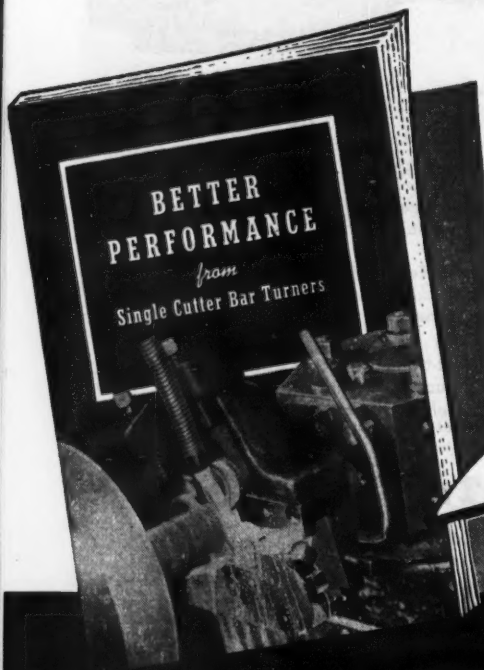
"BROTHER, *THAT HOLE* ISN'T THERE JUST FOR *DECORATION!*"

Know the Full Possibilities of This Basic Tool in Bar Turning

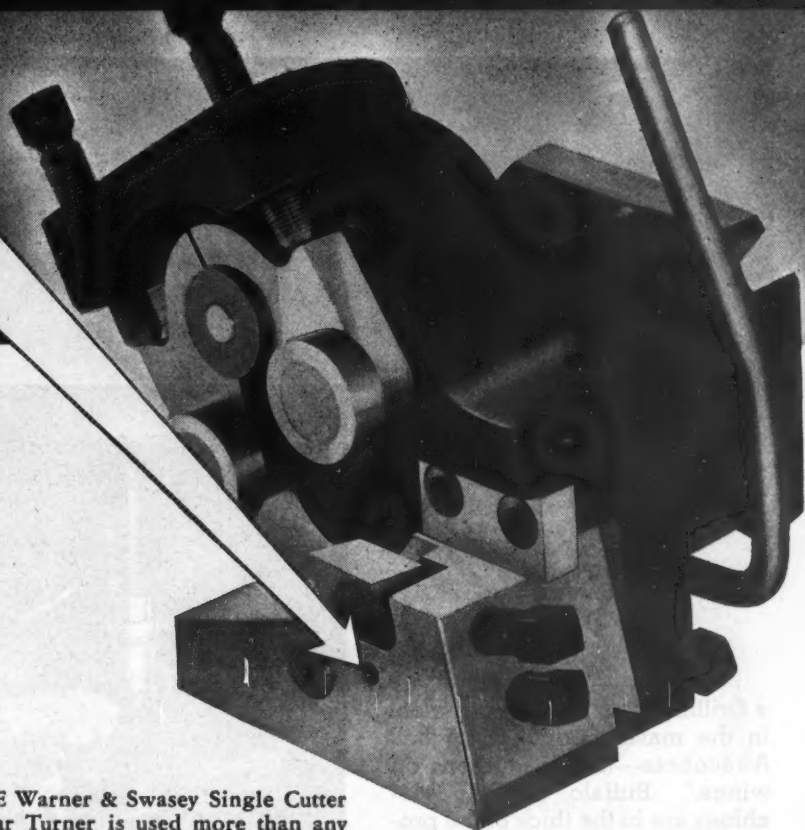
FIELD STUDIES in scores of plants have shown an urgent need for a more thorough understanding of the Single Cutter Bar Turner. For example, we found operators—experienced operators—having difficulty in positioning cutters of

varying thickness in the cutter slot. The remedy is simple—a hollow set screw wrench used through the hole in the front of the block permits easy adjustment of a screw for backing up the cutter.

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY



New Single Cutter
Bar Turner Manual
Points Many Ways to
Increased Production



THE Warner & Swasey Single Cutter Bar Turner is used more than any other tool in turret lathe setup for bar work. It is designed and built to hold close limits and deliver fine finishes under fast production. When undersized or oversized diameters occur or "barber-pole" finishes appear, invariably they can be corrected by an operator who knows how to adjust and use the tool.

To give operators a thorough knowledge of a tool they use most often and to provide definite helpful hints that will result in better bar performance, we have compiled a 32-page booklet, full of illustrations and diagrams. It will be sent on request.

**TO GET YOUR COPY,
MAIL COUPON
NOW!**

Warner & Swasey Operator's Service Bureau, Cleveland, Ohio
Please send booklet, "Better Performance from Single Cutter Bar Turners".

Name

Address

City State

MM-12 I work at (Company)

**WARNER
&
SWASEY**

Turret Lathes

Cleveland



• Drilling is no small assignment in the mass production of Bell Airacobras—those “cannons on wings.” Buffalo Drilling Machines are in the thick of the production battle, performing with the same effectiveness that is helping Airacobras win air battles on distant fronts. Buffalo Drills are matched to the toughest emergency demands—even for inexperienced operators. Built to highest tool standards, there’s a Buffalo Drill for exacting production work as well as the precision needs of the tool room. Engineering data on request.



Photo Courtesy Bell Aircraft Corp.



BUFFALO FORGE COMPANY
 388 BROADWAY BUFFALO, N. Y.
 Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

DRILLING MACHINES

"American"

GRINDING WHEELS



for Accuracy on RUGGED jobs

Whether they're smoothing welds, precision-grinding parts for transmission assemblies and turret mechanisms or sharpening cutting tools, "American" Grinding Wheels are working night and day in America's great tank arsenals, helping to grind out tanks... from tread and bogies to turret top. Here, as on other vital war jobs, "American" Grinding Wheels prove again their uniform high quality and grinding efficiency.

Let us know your grinding needs.



AMERICAN EMERY WHEEL WORKS

ESTABLISHED 1898

PROVIDENCE

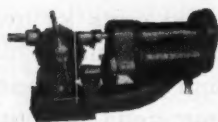
RHODE ISLAND

A HIGHLY DEVELOPED LINE...

Avey



MA 8—Eight speeds. 1200 to 12,000 R.P.M. Small work up to $\frac{3}{8}$ ". Built-in motor. Bench and column types. 1 to 6 spindles.



Type B—No. 1, No. 2, No. 3 sizes. Hand feed drilling units. Hand feed tapping units. Power feed drilling units.

ONLY years of steady development can evolve the drilling equipment that is found in the Avey Line of Sensitive Drilling Machines.

The advances required in machining methods caused by the demands for greater output, necessitated more efficient drilling equipment. Avey Drilling Machines have steadily led the field.

Avey High Speed Sensitive Drilling Machines are built in types and sizes to cope with varied needs. They are designed in capacities from the smallest drill gauge size to approximately $1\frac{1}{4}$ inches.

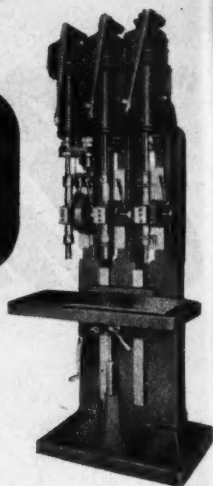
Being ball bearing throughout, they rate the highest speeds without vibration. This feature insures maintained accuracy.

The Avey Catalog details the line of Avey Drilling Machines and Drilling Machine Accessories.

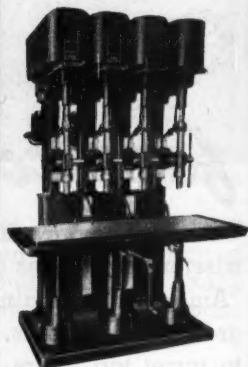
Avey Engineers will come to your aid in solving new and different drilling problems.

Individual Motors for each Spindle.
Single and Multiple Spindles.

AVEY
DRILLING MACHINE CO.
CINCINNATI · OHIO



MA 6—Six speeds. No. 2 and No. 3 sizes. Built-in motors.



Belted quick speed change machine. No. 2 size. Four speeds. Standard frame motors.



Avey

**DRILLING
MACHINES**

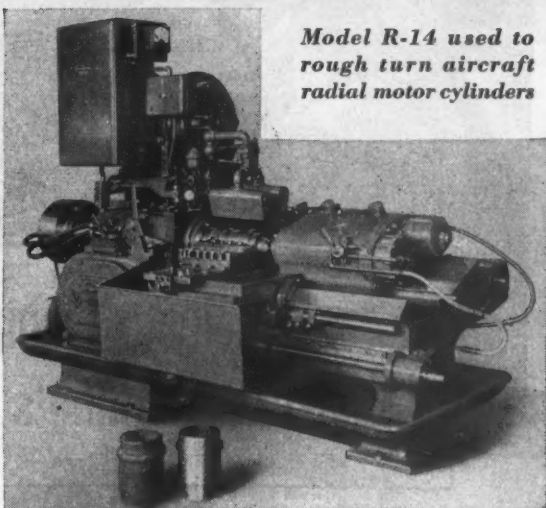
Lo-swing MODEL R-14 LATHE

A Big, Powerful Automatic for Armament, Aircraft, Truck and Tractor Work.

● The Model R-14, with its generous capacity and weight, provides the power, rigidity and tool support necessary for heavy, multiple-tool turning. It incorporates the Seneca Falls Simplified Change-Over Mechanism as a built-in feature. This mechanism makes change-over from job to job merely a matter of a few minutes adjustment. Length of carriage stroke and rapid traverse adjustment may be varied without changing any cams.

Mass, rigidity and adequate tool support to stand up under heavy cuts are inherent structural features of the Model R-14 Automatic. Positive operation, wide flexibility and servicing simplicity are important advantages accru-

Model R-14 used to rough turn aircraft radial motor cylinders

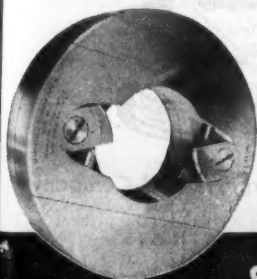


ing from its typical *Lo-swing*, 100% mechanical design with complete absence of clutches in the feed train. All rotating shafts are equipped with anti-friction bearings and are automatically lubricated. Carriage Ways are of wear-resisting Hardened Steel, thus assuring years of satisfactory service.

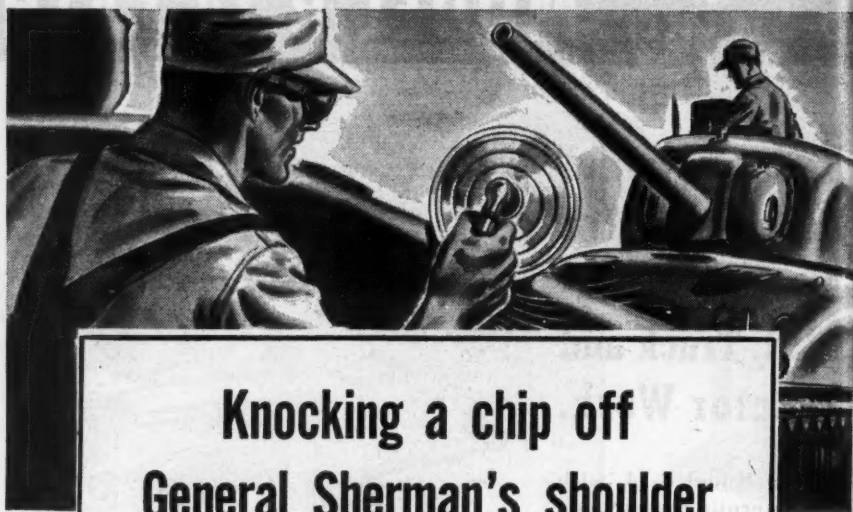
Model R-14 may be equipped with a Third Arm (overhead) as well as additional Back-Squaring Attachments, Carriages, Carriage Slides, and work handling devices. Send us your blueprints if you have a turning problem.

SENECA FALLS *Automatic* WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces — straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.



SENECA FALLS MACHINE CO. SENECA FALLS
NEW YORK



Knocking a chip off General Sherman's shoulder

... with an Armour Fibre Combination Sanding Disc!

FROM treads to turret, American tanks are fitted with a watchmaker's precision. And Armour's Fibre Combination Sanding Discs are helping to *get* this flawless fit by polishing parts precisely and quickly!

Coated with flint-hard, razor-sharp aluminum oxide, Armour's Discs cut more evenly, with less heat, in less time! Aluminum Oxide's great strength and keenness results from processing in electric furnaces.

Each particle of grit is cemented ... for keeps ... to the cloth and fibre backing with a special Armour glue.

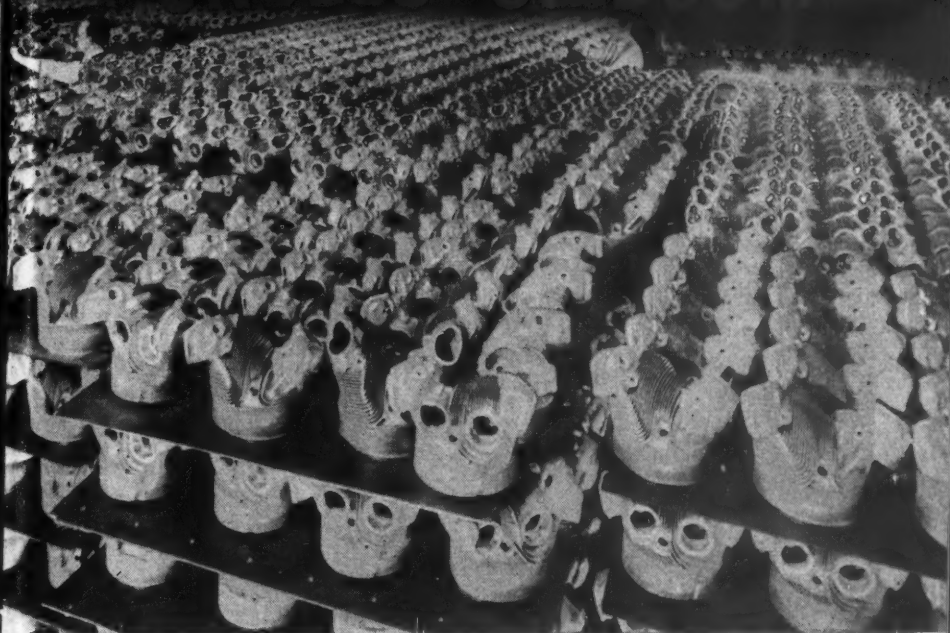
There's an Armour abrasive to fill your needs whether for plastics, metal or wood! So if you have an abrading problem, write to us today!



ARMOUR SANDPAPER WORKS *Division of Armour and Company*

1355 WEST 31ST STREET • CHICAGO, ILLINOIS





STACKED row upon row and looking like skulls foretelling the doom of all United Nations' enemies, these aircraft cylinder heads await assembly into engines for powering war planes.

In the mass production not only of airplane engines, but of countless other munitions now in such demand, war plants everywhere are getting higher output and longer life from their cutting tools through the use of *Texaco Cutting and Soluble Oils*.

Texaco Cutting Oils lubricate the tools, carry away the heat and prevent chip welding. Their use assures improved surface

finish and maximum output per tool grind.

So effective have Texaco Products proved that they are definitely preferred in many important fields.

A Texaco Engineer specializing in cutting coolants will gladly cooperate in the selection of the correct grades of *Sultex*, *Transul-tex*, *Cleartex*, *Britex*, *Almag*, or *Soluble Oils* for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

★ ★ ★

The Texas Company, 135 East 42nd Street,
New York 17, N. Y.

Tune in The Texaco Star Theatre every Sunday night C.B.S.

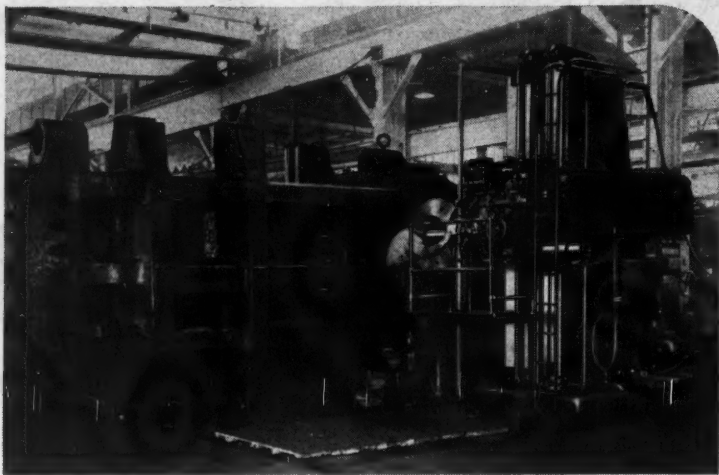
★ Help win the war by returning empty drums promptly



**TEXACO CUTTING, SOLUBLE AND
HYDRAULIC OILS FOR FASTER
MACHINING**

OHIO
STEP UP
PRODUCTION

Orders for this machine are being shipped promptly.



Ohio Horizontal extra heavy duty Boring, Drilling and Milling Machine (floor type) bores steel bed frame of 8" Ajax Forging Machine for crankshaft bearing sleeves. Work done fast, accurately, profitably.—Photograph by courtesy of The Ajax Manufacturing Company, Cleveland, Ohio.

When America's first all-anti-friction boring, drilling and milling machine appeared 13 years ago, it bore the name of Ohio. Ever since, we have endeavored steadily to add new features worthy of this precedent. Example: a portable control feature which enables the operator to get more work done in less time with less effort. Other features: nitrided spindle, narrow guides, internal gear-tooth type clutches, uni⁹ construction, anti-friction bear-

ings, built-in rapid traverse to spindle and all other parts, continuous spindle feed of 72" with full-length spindle support, push-button control. Floor and table types in both heavy duty and extra heavy duty models.

Ask for a copy of our well illustrated Bulletin 300.

Orders for Ohio Horizontals are now being shipped with reasonable promptness. Better indicate your requirements at once.

THE OHIO MACHINE TOOL COMPANY, KENTON, OHIO

OHIO DREADNAUGHT
HORIZONTAL BORING, DRILLING AND MILLING MACHINES • SHAPERS • PLANERS



Just off the press! Your copy of the New Jarvis Catalog

This 60 page book is the finest catalog we have ever published. It is fully illustrated and contains descriptions and specifications of Flexible Shaft Machines, Ground Rotary Files, and Jarvis Tapping Attachments. It also contains much valuable engineering and maintenance data. Engineers as well as those who specify and purchase these types of power tools should have this catalog in their files.

Send for your copy now

THE CHARLES L. JARVIS CO.

Corner Pease Ave. and Stack St.

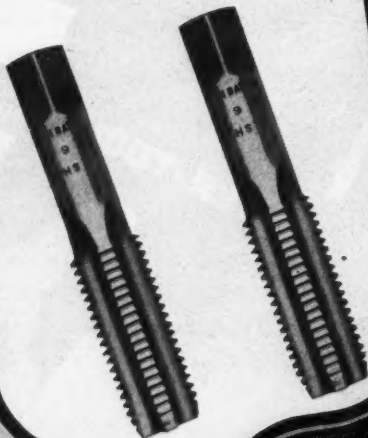
MIDDLETOWN, CONN.

October, 1943

MODERN MACHINE SHOP

27

Bath Taps



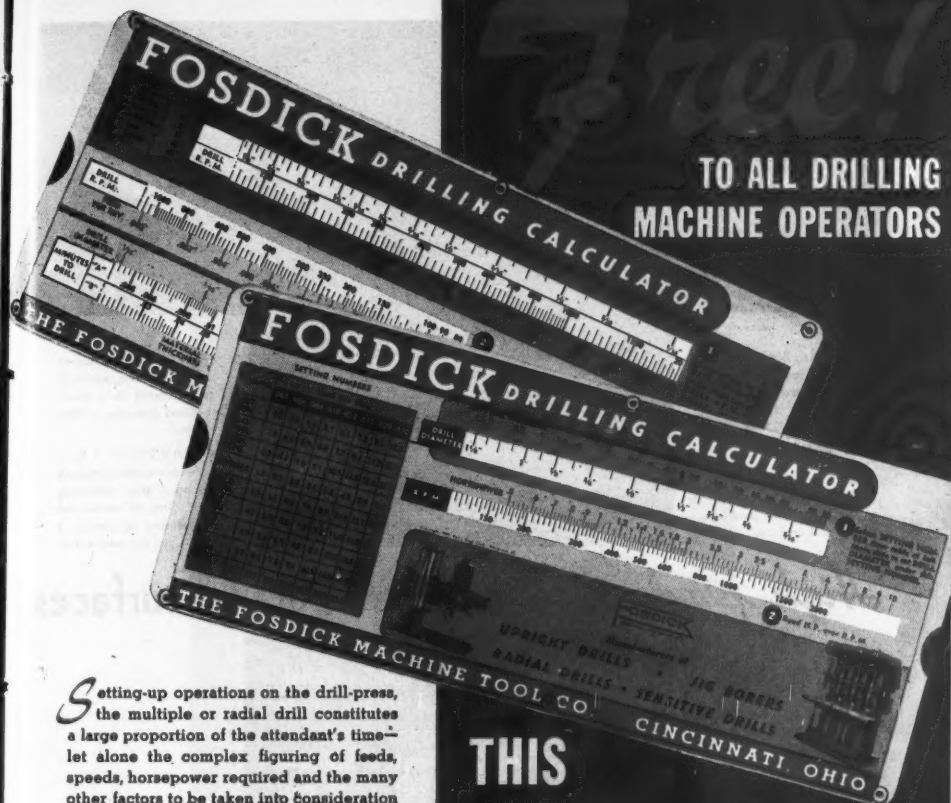
You get long life and precision from these taps because that is what Bath puts in them.

Through a special process of grinding from the hardened solid, Bath taps are made — and they are not excelled for accuracy.

It will pay you to use Bath Taps.

JOHN BATH & CO. INC.
WORCESTER • MASS.

TO ALL DRILLING
MACHINE OPERATORS



Setting-up operations on the drill-press, the multiple or radial drill constitutes a large proportion of the attendant's time—let alone the complex figuring of feeds, speeds, horsepower required and the many other factors to be taken into consideration each time a drill diameter is changed or a new ferrous or non-ferrous metal is machined . . . To lessen the calculating time of the operator and to provide for a more positive, guess-free set-up, FOSDICK has created and assembled a limited quantity of Drilling Calculators on the slide-rule principle. Printed legibly on a durable, varnished stock in four colors, these instruments accurately take into consideration every conceivable factor to be adjudged in the proper drilling of all metals . . . a handy accessory to all drilling equipment—especially to the designed accuracy of the complete FOSDICK line of drilling machinery . . . We invite you to use the handy coupon to obtain prompt delivery of your Calculator!

THIS

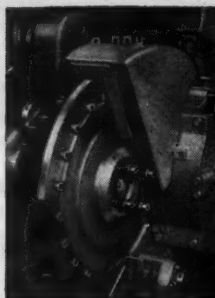
DRILLING CALCULATOR

**THE FOSDICK MACHINE TOOL COMPANY
CINCINNATI 23, OHIO**

Please send me one of your FOSDICK Drilling Calculators as currently announced, without any cost or obligation to me.

Operator's Name.....
Firm Name.....
Address.....
Superintendent.....
Foreman.....
Type Machine Operating.....
Serial Number of Machine.....
How Long Operating Machine.....

MMS



ABOVE: Blade spring pack retainers ground on parallel faces at the rate of 20 TO 25 PIECES PER MINUTE by the rotary-carrier method.

Stock removal, .005" to .008" over all; tolerances, .001" for parallelism and uniformity.



ABOVE: Camera shutter parts of chrome vanadium steel, ground in a hand-operated gun-type sliding fixture.

PRODUCTION: 2 to 6 pieces per minute, depending upon size; removing .030" over all stock, and maintaining tolerances of .002 - .003 for uniformity.

High production on small parallel surfaces

PLANTS encountering small parallel-surface work similar to the parts shown here, are finding that the Gardner No. 77A-12" Double Spindle Grinder will turn them out at high production rates, and to close accuracies, as well.

This machine is easily adapted to either semi-automatic operation, as in the "close-up" at the left, or to purely hand-operated fixtures, as seen in the right-hand illustration.

Time-study figures are given under the "close-ups" — they indicate the remarkable possibilities of this handy Double Head Gardner Grinder.

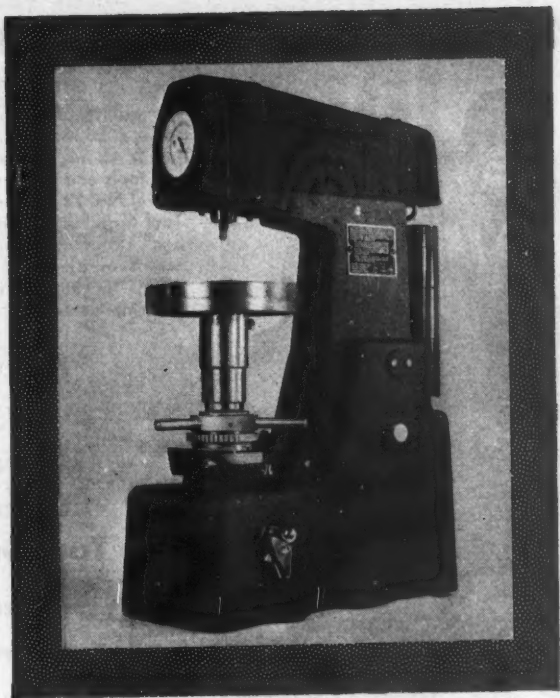
**If You Finish Small Parallel Surface Parts—
WRITE FOR DATA ON
THE GARDNER No. 77A
GRINDER!**

**GARDNER - GRIND
YOUR Flat SURFACES**

GARDNER MACHINE COMPANY

428 East Gardner Street * * * * Beloit, Wisconsin, U.S.A.

"ROCKWELL" HARDNESS TESTER



DELIVERY: Quick

MODELS: Vastly Improved

PRICES: Since last March prices have been lower than ever—lower even than they were 20 years ago.

Only Wilson makes the "ROCKWELL"

WILSON

MECHANICAL INSTRUMENT CO., INC.

383 Concord Ave.,
New York 54, N. Y.

October, 1943

MODERN MACHINE SHOP

31

THE ANSWER to your CUTTER AND TOOL GRINDING PROBLEMS



For detailed specifications on the fast, flexible Covell No. 22 Universal Cutter and Tool Grinder, write, wire or phone today for Bulletin MM-103 and name of nearest dealer.

The ability of your plant to meet today's production demands depends to a great extent on keeping tools and cutters in A-1 shape. Covell No. 22 Universal Cutter and Tool Grinder is swiftly solving tool and cutter grinding problems in scores of plants — enabling tool rooms to keep pace with production-line demands.

COVEL No. 22 Universal Cutter and Tool Grinder

FEATURES

- Heavy, Rugged Box-Type Bed
- All Controls Handy to Operator
- Sensitive Control
- Cartridge-Type Spindle
- Complete Dust Protection
- Quick Alignment of Attachments
- Hardened Anti-friction Ways
- Adjustable Micrometer Stop (Swing-Type)
- Large Assortment of Attachments



INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICHIGAN U. S. A.

GRINDING MACHINERY SINCE 1874

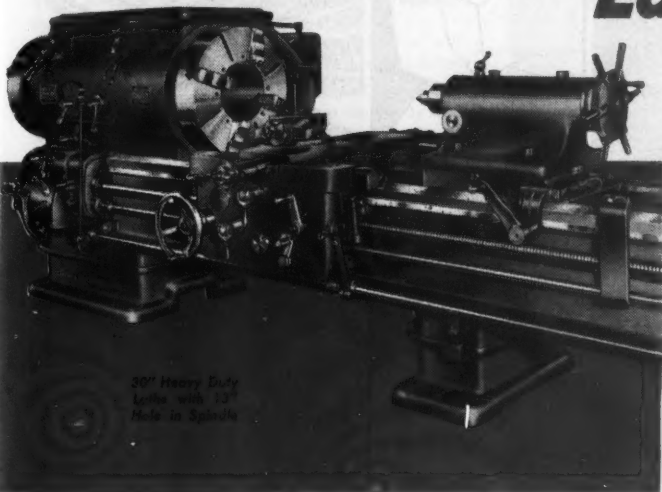
Speed War Production-Improve Work

WITH

HYDRATROL

LARGE HOLLOW SPINDLE TYPE

Lathes



30" Heavy Duty
Lathe with 12"
Hole in Spindle

**LARGE
SELECTION
OF SIZES**

**Provide Wide Range
of Usefulness and
Efficiency**

SMALL

18"—Up to 7 1/4" Hole

MEDIUM

24"—Up to 12" Hole

LARGE

27"—Up to 13" Hole

30"—Up to 14" Hole

36"—Up to 16 1/2" Hole

Check these 8 Distinctive Features

- Easy, Fast, Simple Operation.
- Hydraulic Brakes and Clutches.
- Absence of Mechanical Troubles.
- Automatic and Ample Lubrication.
- Essential Operating Information Automatically Presented (on all Standard Models).
- Mechanism Protected by Automatic Control.
- Extraordinary Hardness of Bed.
- Available with Large Turrets for carriage which fully utilize the Great Power Capacity of these machines; and with Beds on both ends of Headstock.

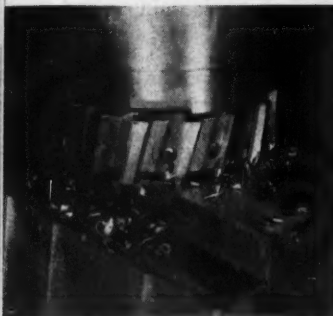
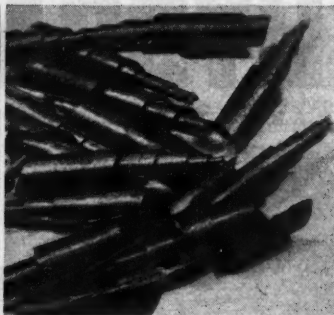
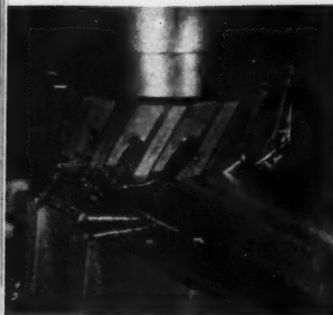


18" Lathe with
7 1/8" Hole in Spindle

Lehmann
MACHINE COMPANY

CHOUTEAU AT GRAND * SAINT LOUIS (3) MISSOURI

NEW FACE-MILLING PERFORMANCE WITH



The Ingersoll Shear Clear face mill is a patented design based on the discovery of entirely new cutting angles. The blades are set in the cutter body at steep negative rake and positive shear angles . . . The blade strikes the work-piece at a point ahead of center on its beveled cutting edge and gradually increases the chip width in a shearing action. (See upper sketch). It has been proven that a blade thus eased into the work causes far less impact shock and suffers less itself than the conventional blade, whose cutting edge

strikes the work-piece squarely. (See lower sketch) . . . Here the blades are set at relatively slight rake and shear angles.

The Shear Clear chip coils evenly and continuously outward and falls away from the cutter at the end of the cutting arc . . . This is demonstrated in the upper row of photographs . . . Chips of the conventional cutters break up and fall under the face of the cutter, there to be ground over the milled surface. (See lower photographs).

THE INGERSOLL MILLING

SHEAR CLEAR

Ingersoll Shear Clear face mills are especially adapted to work in tough steel and the soft, stringy non-ferrous metals . . . They will solve many of the problems you are experiencing in milling these materials.

Some of these cutters are being used in one-cut operations, producing surfaces smooth enough to eliminate the finishing cut.

Their free cutting, shearing action permits you to use much higher feed rates . . . Many users have tripled their former feed rates. Some are cutting at four to six times faster feeds than before under identical machining conditions.

Cutting steel at 10" a minute feed, the Shear Clear cutter shown on foregoing page removed double the depth of stock cut by the conventional cutter feeding at only 4" a minute — and produced a smoother finish.



If you are milling flat surfaces it will pay you to investigate the benefits of applying Ingersoll Shear Clear Cutters to your work. Your inquiry should state diameter and hand of cutter, type of material and amount of stock being cut.



MEDIUM DUTY SERIES for milling cast iron or steel where stock does not exceed 5/16".



HEAVY DUTY SERIES for milling cast iron or steel where stock does not exceed 1/2".



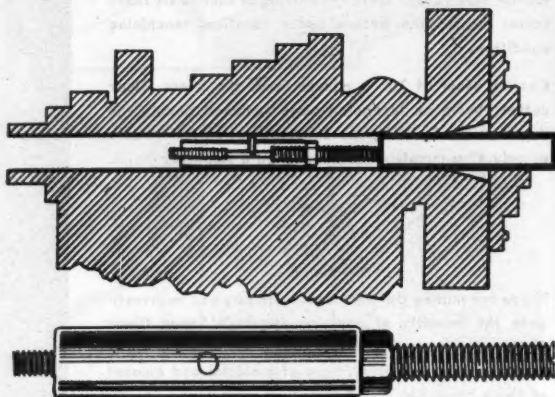
EXTRA HEAVY DUTY SERIES for milling cast iron or steel where stock does not exceed 1".

MACHINE CO., ROCKFORD, ILL.

STEP-UP YOUR LATHE PRODUCTION WITH THE **CARLSON** *Spindle* LATHE STOP

The Carlson Spindle Lathe Stop is designed to speed up and simplify lathe operation, especially in machining parts on a mass production schedule. When placed at correct position in spindle for first part, it automatically provides permanent set-up for remaining parts to be machined to same dimensions, regardless of quantity. The Stop can be placed anywhere within the spindle. It is fitted with an adjustable screw which can be extended out in center of chuck jaws when chuck is needed for working on small parts.

- SPEEDS OUTPUT
- REDUCES REJECTS
- SAVES SET-UP TIME
- ASSURES ACCURACY
- REQUIRES ONLY
SEMI-SKILLED LABOR



EASILY ATTACHED

The Carlson Spindle Lathe Stop can be installed in a few minutes. When ordering, please mention make and model of lathe; also specify inside diameter of lathe spindle.

MODEL No. 101 — Inside diameter $\frac{3}{4}$ -inch fits South Bend, Logan, Atlas, Sheldon, and other make bench-type lathes. PRICES ON OTHER SIZES FURNISHED ON REQUEST

5.95

DEALERS' INQUIRIES INVITED

SCHULTZ & ANDERSON CO.

109 EDISON PLACE, NEWARK, 5, N. J.

MANUFACTURED BY GREENFIELD MACHINE & TOOL WORKS

It's New... Logan

QUICK CHANGE GEAR LATHE



with
FRICTION FEED
AUTOMATIC APRON

Precision Built FOR SUSTAINED ACCURACY

The variety of work it handles... the speed, accuracy, and safety of its operation place this new lathe in a class by itself. It combines compactness, economy and versatility. With its friction feed automatic apron and precise construction throughout, this new Logan Quick Change Gear Lathe is by every standard a rugged, highly adaptable machine of sustained accuracy. Bed ways, for example, are precision ground to within .001", of absolute accuracy. Total run out of the headstock spindle 12 inches from the bearing is less than .001". The lead screw is held to within .002" in 12 inches. All moving parts are protected by ball bearings or by self-lubricating bronze bearings. As for economy, the new Logan No. 820 quickly pays for itself through lowered unit costs.

LOGAN ENGINEERING COMPANY • Chicago, Illinois

Logan

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

Brief Facts

- Swing over bed 10½"
- Bed length 43½"
- Spindle hole 25"/32"
- Precision ground ways: 2 prismatic "V" ways; 2 flat ways
- 12 spindle speeds—30 to 1450 per minute
- Worm drive from lead screw spindle for power feeds
- Friction clutch on power feeds
- Longitudinal feed .0015 to .1000" per spindle revolution
- Cross feed .25 times longitudinal feed
- Half nut drive from lead screw thread for thread cutting
- Threads—48 selections RH or LH—4 to 224 per inch

Parker Power Tube Bender, built by The Parker Appliance Co., Cleveland, O., employs NOPAK Model A Air Cylinder to extract mandrel.



NOPAK **Cylinder Power**

Extracts the Mandrel on Tube Bending Operation

Before tubes or pipes are bent on Parker Tube Benders, a mandrel is inserted to prevent crimping at the point of bend. After the bending operation, the mandrel must be extracted without loss of time so the machine can function at top efficiency.

The powerful pull which extracts the mandrel is supplied by a NOPAK Model A Cylinder of proper stroke and diameter. Speed, strength, stamina and adequate pulling power are the basic requirements of air cylinders used on Parker Power Benders.

This application may suggest a new use for NOPAK Cylinders in your plant, or on the machines you build for resale. Write for Illustrated Bulletin No. 82-A.

GALLAND-HENNING MFG. CO., 2758 S. 31st STREET, MILWAUKEE 7, WIS.

NOPAK

Representatives in Principal Cities

VALVES and CYLINDERS

DESIGNED for AIR or HYDRAULIC SERVICE

BUILT FOR FAST TAPPING from head to foot—

Ettco-Emrick FOOT-OPERATED TAPPING MACHINE

From the 2-spindle Head, with its hair-trigger sensitive friction clutch and automatic reverse, right down to the delicately counter-balanced foot pedal, the Ettco-Emrick Tapping Machine is designed and built to make high speed, accurate tapping sure and easy.

All the operator has to do is feed the work and step on the foot pedal. The skill ordinarily needed in tapping and the speed are built into the machine.

That's why unskilled operators—men or girls—can easily maintain productions up to **24,000 holes per hour** with the standard head and all the way up to **12,000 holes per hour** with available Ettco-Emrick Multiple Spindle Heads.

THESE BULLETINS GIVE DETAILS

BULLETIN No. 4 covers the Tapping Machine.

BULLETIN No. 3 covers the Multiple Heads.

Copies mailed to you on request.

ETTCO TOOL CO.

598 Johnson Ave., Brooklyn 6, N. Y.

DETROIT



CHICAGO

IMPORTANT

Recommendations on the best way to handle specific tapping jobs are always available to users of ETTCO-EMRICK equipment.



A 2-Spindle Head is standard equipment on the Tapping Machine

25 YEARS OF SPECIALIZATION IN MACHINE TAPPING EQUIPMENT

BRADFORD *Metalmaster* LATHE

How to get Lifetime Service
from the

BRADFORD METALMASTER

Metalmaster Lathes are fully capable of 3-shift a day war-time service, but under such conditions correct oiling becomes triply important! Establish a definite lubrication schedule and stick to it. Make it the first job of every operator to fill all oil cups and oil holes daily. Make it the responsibility of some one, such as the day shift operator, to see that V-ways, motor, head, apron and other parts which are not oiled daily are always supplied with sufficient lubricant.

Metalmaster Lathes are built with generous oil reservoirs and easily accessible oil cups. A plunger pump, operated from the spindle, forces oil through a filter to all the bearings, including the drive shaft and clutch housing. We've made it easy for you to keep your lathe correctly oiled. Don't leave this important job for the other fellow. Do it yourself and keep your Metalmaster working for Victory!

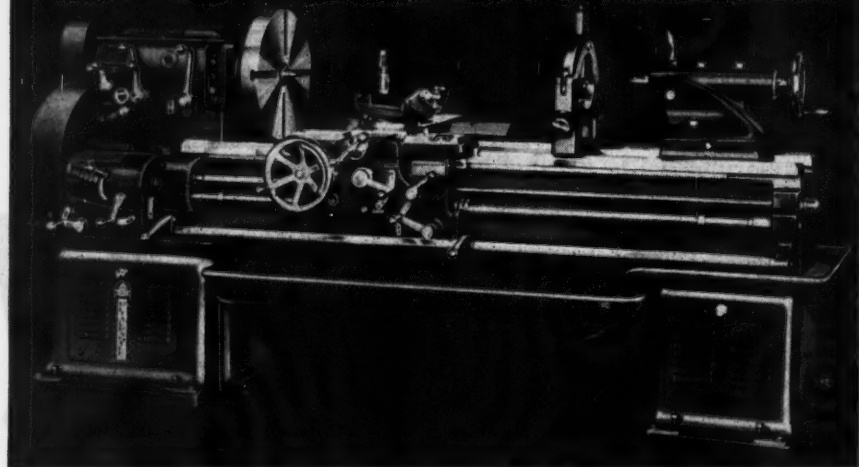
Write for illustrated folder
giving full particulars about
Bradford Lathes.

Also Manufacturers of Unit Type Drill-
ing and Tapping Machinery.



1840 • 1943

for the Battle of Production



THE *Bradford Machine Tool Co.*
EVANS AT EIGHTH ST. • CINCINNATI, OHIO



220 VOLTS ON THE NOSE —Here's JAP JOLTAGE where it hurts!

Other "Jap Jolters" Covered in Booklet

How Often Should Tools Be Inspected?
What To Do When Tools Are Inspected.
Correct Amounts of Grease To Use.
Ball Bearings—Replacement and Care.
Switches—How To Prolong Their Life.
Care and Repair of Cable.
Causes of Stator Troubles and Overheating of Tools.
How To Order Spare Parts.
Selection of Frequency Changers.
"Shorts", "Grounds", Single-Phasing.
Fusing For Peak Output.
Safety Rules.

Ask for "Keep 'em Working" Manual

HIGH-CYCLE tools are designed for operation on 220 volts and best results are obtained if voltage does not exceed 240 or drop below 210.

High voltage causes tools to heat under light loads; low voltage makes them heat under heavy loads. And overheating is hard on the tools.

Hence to keep your High-Cycle tools whirling to Victory—watch your Voltage! Check it from time to time and keep it at maximum Jap-joltage—220 volts (at the tool).

Power Supply and Wiring on Page 8 of the booklet "Keep 'em Working", is just one of many full discussions of High-Cycle maintenance pointers to keep your tools up to war-winning par.

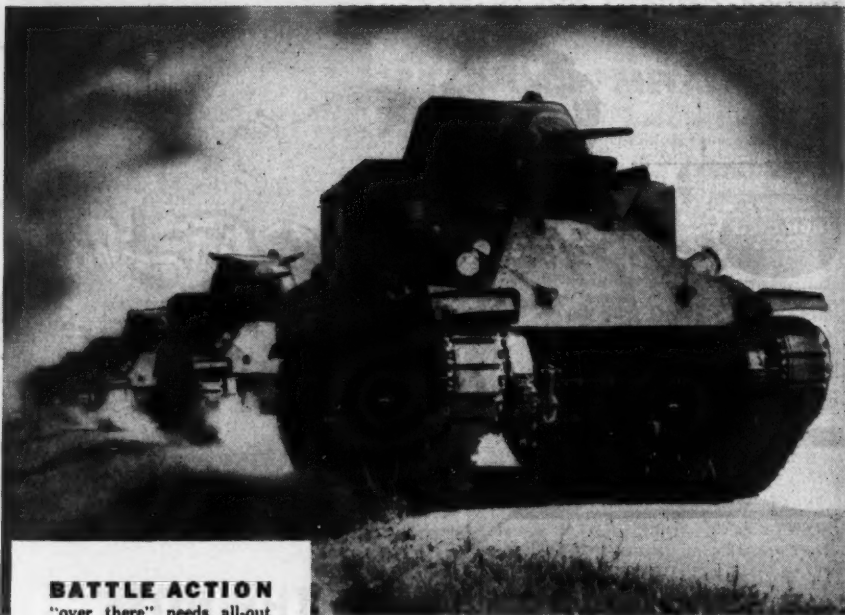
These pointers are also presented in condensed form on a handy wall chart. A similar Plan is available for AIR tools. They're free to plants that'll put them to work.

AIR

THE ROTOR TOOL CO.

CLEVELAND, OHIO

HIGH
CYCLE



BATTLE ACTION

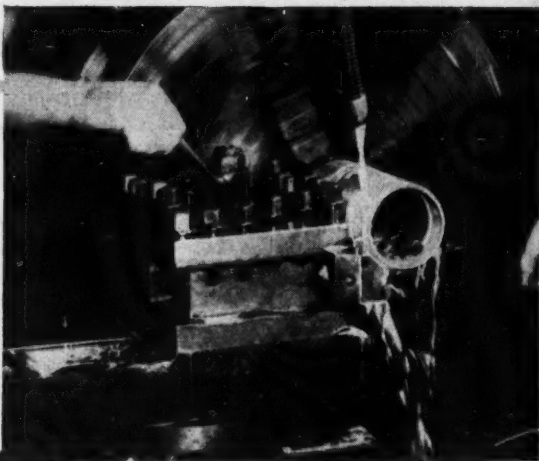
"over there" needs all-out production here. To maintain full output in MACHINING operations use . . .

Official U. S. Army Signal Corps Photograph

... SINCLAIR CUTTING OILS and COOLANTS.

These oils promote highest cutting speeds, low tool expense, better finish, and reduced cost per unit machined. Sinclair provides a diversified line of specialized oils adapted to all individual problems.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY (INC.), 630 FIFTH AVENUE, NEW YORK 20, N. Y.

FOR STRAIGHT, TAPER, BEVEL OR STRAIGHT AND BEVEL GRINDING

Rivett No. 112 Universal Precision Grinder is primarily for grinding shafts. Available internal and external spindles in combination with head adjustments make possible a great variety of grinding operation. Simplicity of design enables any mechanic familiar with grinding to operate the machine.

Work may be set in solid, ground, or roughed surface and driven at required speed. Power feed rate may be set at one of sixteen selective speeds, ranging from 100 to 1000 feet per minute. Length of table travel of spindle is adjustable between 1/2" and 1". High speed wheel and low speed wheel spindle brackets, as illustrated, may interchangeably be mounted as required on cross slide. Workhead, table and cross slide are swiveled individually or in combination for taper and bevel grinding.



High Speed Internal
Spindle



External Spindle
and Tailstock

SPECIFICATIONS

Grinding cap, hole dia.	1/8" to 6"
Grinding cap, outside dia.	up to 8"
Automatic table travel	1/2" to 6"
Table speeds	16 selective
Hand table travel	18"
Swing over table	14"
Workhead swivel	90°
Table swivel	5°
Cross slide swivel	90°
Cross feed graduations	.0005"
Travel of cross slide	11 1/2"
Collet capacity	1 1/2"
Step chuck capacity	3"
Jaw chuck capacity	2"
Workhead spindle speeds	150, 300, 600 r.p.m.
Grinding spindle speeds:	
Standard int.	4500 and 10000 r.p.m.
High speed int.	25000 r.p.m.
External	4500 r.p.m.
Automatic Oil Lubrication	
Net weight with motors	3700 lbs.



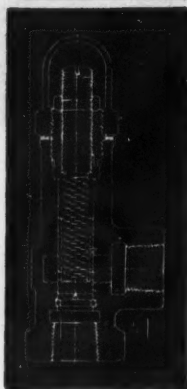
For Further Description
Write for Bulletin 112

RIVETT LATHE & GRINDER INC.

BRIGHTON, BOSTON, MASS.



FULFLO PUMPS and VALVES



BY-PASS OIL RELIEF NON- CHATTERING VALVES

Standard, flanged or special types. Pressures from 0 lbs. to 350 lbs. Cast iron or brass bodies. Brass, hardened or stainless steel pistons.

Silent Partners on the Biggest Job in World History

FULFLO PRODUCTS are unheard and unsung . . . but they're there working away quietly, efficiently and unobtrusively.

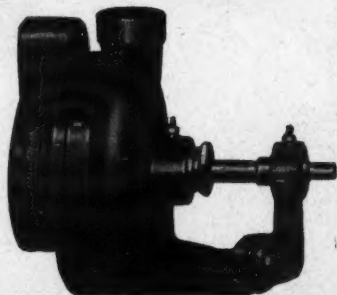
Scientifically engineered . . . precision-built . . . exquisitely balanced to work in your plant or in your products for war or peace.



CENTRIFUGAL COOLANT PUMPS

Motor, direct or belt driven. Patented seal. Splash-proof, ball-bearing motors. Scores of regular models. Special types designed for your special purposes.

Write for the FULFLO DATA BOOK



Model NOR

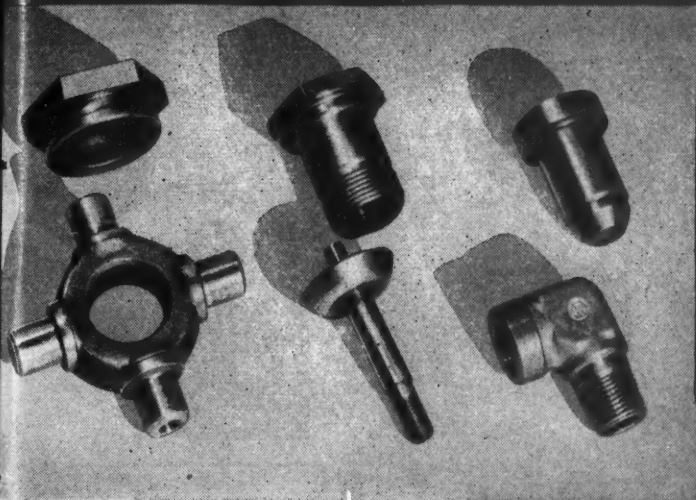
THE



Specialties Co., Inc.
BLANCHESTER, OHIO

How to *SPEED UP*

END FORMING AND END TURNING



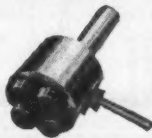
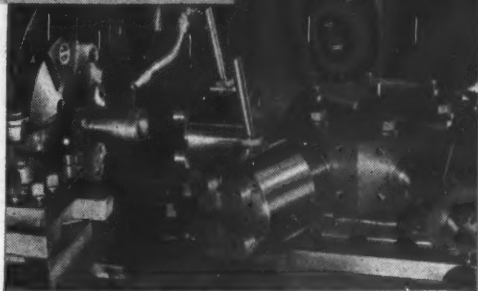
and
maintain
uniform
accuracy

FOUR cutting edges, in one automatic head, do *three* times the work of any single point tool.

For diametric adjustments, you don't fuss with separate cutters for different diameters—one adjustment of circular mills brings them all to size—right on the machine.

Namco self-opening die heads with multiple circular hollow milling cutters turn out thousands, or hundreds of thousands, of identical pieces with positively NO variation in dimensions. Namco heads are double-duty tools; circular ground thread chasers are interchangeable with hollow milling cutters.

Here is the modern way to cut costs without loss of precision. Catalog D-42 gives complete information.



Hollow milling, threading and tapping with Namco die heads and collapsible taps.

NATIONAL ACME CO.

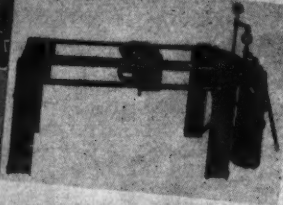
170 EAST 131ST STREET • CLEVELAND, OHIO

ACME GRIDLEY 4 G AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

New KRW HYDRAULIC PRESS BULLETIN Now Ready

HYDRAULIC
ARBOR PRESSES

K. R. WILSON



See the new 100-ton hydraulic arbor press, the largest in the line, with a capacity of 100 tons. It is the only one of its kind in the world. It is the only one of its kind in the world. It is the only one of its kind in the world.

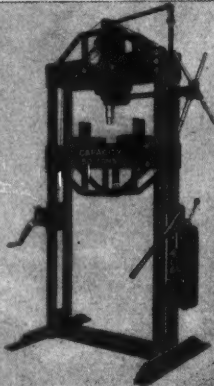


See the new 100-ton hydraulic arbor press, the largest in the line, with a capacity of 100 tons. It is the only one of its kind in the world. It is the only one of its kind in the world. It is the only one of its kind in the world.



See the new 100-ton hydraulic arbor press, the largest in the line, with a capacity of 100 tons. It is the only one of its kind in the world. It is the only one of its kind in the world. It is the only one of its kind in the world.

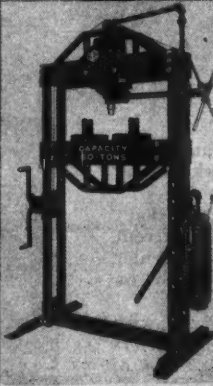
NO. 37 E
50 TON PRESS



SPECIFICATIONS

Capacity	50 Tons
Stroke	18 in.
Weight	15,000 lbs.
Dimensions	48 in. x 48 in. x 72 in.
Pressure	10,000 psi
Material	Steel
Finish	Paint
Warranty	1 Year
Price	\$1,500.00

NO. 37 G
60 TON PRESS



SPECIFICATIONS

Capacity	60 Tons
Stroke	18 in.
Weight	18,000 lbs.
Dimensions	50 in. x 50 in. x 72 in.
Pressure	10,000 psi
Material	Steel
Finish	Paint
Warranty	1 Year
Price	\$1,800.00

60 TON BENDING PRESS

Typical page
from the new
KRW Hydraulic
Arbor Press
Bulletin.

Not only a complete catalog of the full KRW Arbor Press line, but an "idea book" for production men. Describes many new attachments, fixtures and special presses developed by KRW to speed war production. Illustrates the new 60-ton KRW Hydraulic Press, the 25, 50 and 75-ton sizes, and KRW Bench Type Arbor Presses in 1/2, 1

and 3-ton capacities. Write for your copy today

K. R. WILSON
10 LOCK ST. BUFFALO 2, N. Y.

STAMPING

MULTIPLE CHARACTERS

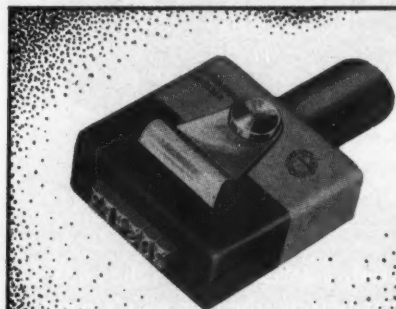


with Matthews
'Champion' HOLDER

Made for hand stamping or press use . . . Matthews 'Champion' Holder can be used for 90% of all heavy or medium duty marking applications. Type changing is amazingly fast . . . marking is clean cut and in alignment. Write for Catalog 146-A for full particulars.



FOR HAND STAMPING



FOR PRESS STAMPING



FOR
STAMPING
ROUNDS

JAS. H. MATTHEWS & CO.



3944 Forbes Street Pittsburgh, Pa.

Branch Plants

New York, Boston, Chicago, Philadelphia, Newark, Syracuse

District Sales Offices

Cleveland

Detroit

Hartford

Birmingham

COLOR COMES TO CARBIDE!

A NEW SERVICE TO FIRTHITE USERS



Firth-Sterling announces "COLOR-BRANDING", — a new way of marking FIRTHITE Sintered-Carbide Tips and Tools so that the user can determine the grade of carbide at a glance . . . clearly . . . unmistakably.

Eight different "colors" now appear on FIRTHITE unmounted Tips: red, white, blue, green, yellow, brown, black, purple. These unmounted Tips reach the user

already color-branded on the outer end. After brazing, the user simply paints on the tool shank the color that appeared on the **Tip** before it was brazed.

The handy FIRTHITE **Color Chart** is available to users on request. This chart is mounted for hanging on the wall. It is a quick-reference guide to the selection of FIRTHITE Sintered-Carbide Tips and Tools.

Firth-Sterling Steel Company

OFFICES: MCKEESPORT, PA. NEW YORK HARTFORD PHILADELPHIA CLEVELAND DAYTON DETROIT CHICAGO LOS ANGELES



8 Firthite Grades now "Color-Branded" FOR QUICK, EASY, SURE IDENTIFICATION

(For fuller descriptions of these grades, see pages 10 and 11 of Firthite Users' Handbook—
or consult a Firthite Engineer.)



HA

The peak-production carbide for finishing hard, abrasive irons, non-ferrous and non-metallic materials. Used for turning, facing, sawing, boring, and reaming.



TA

The general-purpose carbide for cutting all types of steel in high-speed production. TA machines both ferrous and non-ferrous materials, such as aluminum.



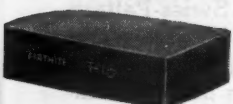
T-04

The heavy-duty carbide for coarse feeds, heavy and interrupted roughing cuts. Closest approach to a universal grade. Machines armor plate, softer steels, cast iron, etc.



T-89

The special-purpose carbide for rough turning shells, etc. Withstands shock and jump cuts. T-89 is resistant to corrosion, erosion, heat, wear, and chip cratering.



T-16

The super-speed carbide for light, rapid finishing of harder steels, shells, etc. T-16 is especially suited for "Hyper-Milling" of heat-treated alloy steels.



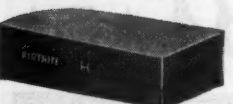
T-31

The precision-work carbide for lightest, fastest, shallow cuts on hard, alloy, and treated steels. Hardest, most wear-resistant grade for precision boring, etc.



HC

The carbide for hogging cuts on soft materials at slow speeds. Excellent for skiving brass and grooving aluminum-alloy pistons. Withstands impact, vibration, abuse.



H

The average-conditions carbide. Most dependable grade for general use in roughing softer metals and less abrasive non-metallic materials at moderate speeds.

Firth-Sterling Steel Company

OFFICES: McKEESPORT, PA. NEW YORK-HARTFORD-PHILADELPHIA-CLEVELAND-DAYTON-DETROIT-CHICAGO-LOS ANGELES



**The same
Cross-Section
and
Proportions
*but..***

*No, these three files
are **NOT** identical*

In Swiss-Pattern files, the Pillar, Equaling, and Square Edge Joint types have practically the same cross sections. But these types have definite differences which make them suitable for different kinds of work.

This illustrates the wide variety which is available in Swiss-Pattern files, providing an exactly suitable type for every kind of work. And in "American Swiss" Swiss-Pattern Files, you get this variety with utmost accuracy of size and cut, with uniform hardness assured by special heat treating, and with exceptionally keen filing edges. For faster, better filing, insist on "American Swiss" Swiss-Pattern Files. **SEND FOR CATALOG.**

BUY FROM OUR DISTRIBUTOR

American Swiss File & Tool Co., Elizabeth, N. J.

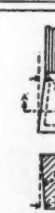
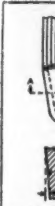
ASK FOR THEM BY NAME

American Swiss ★ ★ ★

SWISS PATTERN FILES

**GR
WI
DATA
Willia**

• W
man
mod
7/8"
instr
Hole
Head



Sold

TOOL HOLD



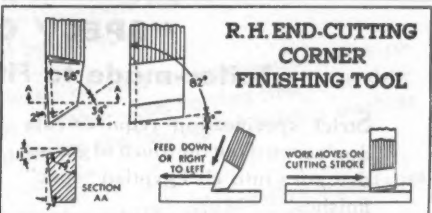
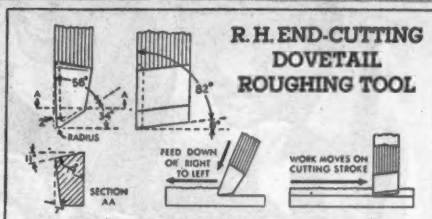
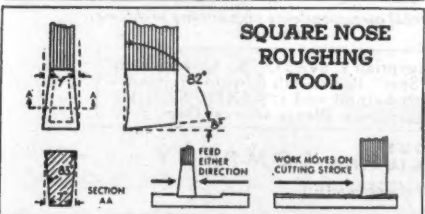
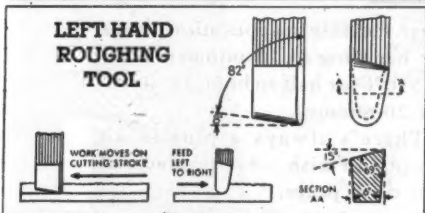
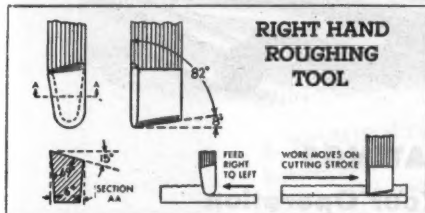
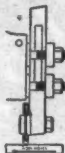
HOW AND WHY

WILLIAMS' TOOLS AID WAR PRODUCTION

GRINDING CUTTERS FOR WILLIAMS' TOOL HOLDERS

DATA SHEET C, covering the various cutters used with Williams' Planing-Tool Holders in machining cast iron.

● Williams' Planing-Tool Holders are manufactured in seven sizes, accommodating cutters from 1/4" x 3/8" to 7/8" x 1-1/8". The following grinding instructions apply to cutters of all sizes. Holders should be clamped in the Tool Head to face, as shown at right.

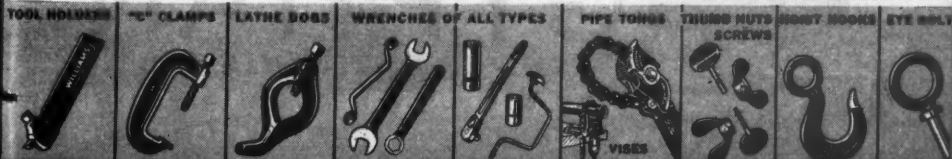


Data Sheets A and B on this subject have already appeared. Additional Data Sheets on grinding of other cutters for Williams' Tool Holders will follow. Reprints of Data Sheets are available on request.

WILLIAMS
HEADQUARTERS
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

© J. H. Williams & Co., 1943

Sold by Leading Industrial Distributors Everywhere
J. H. Williams & Co., Buffalo 7, N. Y.





*Boss, that finish
headache's cured...*

"SPEC" COATINGS

Tailor-made to Fit Your Operation

Strict specification requirements don't crowd out the touch of genius that goes into all Egyptian "spec" finishes.

● AXS-736 REV 1 ●

Take Egyptian's AXS-736 Rev 1 for cartridge cases, percussion primers and other steel surfaces... it's on the beam with the Ordnance Dept. and it fits your own set-up as though it were made to order for you. Extra hard, extra

clear. Flexible in application. Dries for handling in 10 minutes. Bake at 350°F for half an hour, or 400°F for 20 minutes.

There's always a plus in an Egyptian Finish... for products of war or of peace.

★ ★ ★

Special correspondence on finishing problems is invited.

Egyptian's new U. S. Government "Spec" Book—4th Edition—is ready. It's helpful and it's FREE. Send for your copy. Please address Dept. F-10

THE EGYPTIAN LACQUER MANUFACTURING COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.



EGYPTIAN

SUPERIOR FINISHES

HERE'S A BETTER, FASTER WAY TO SPEED THE BURRING OF HOLES!

NOBUR

burr-removing tool
has these EXCLUSIVE features!

1. NOBUR works like a drill—can be used in spindle of any machine—operator works with complete safety!
2. NOBUR's double-edged cutting blade instantly removes burrs around holes in flat or curved surfaces of single or multi-walled parts—smoothly and accurately.
3. NOBUR eliminates slow, costly hand methods of burring holes—speeds production—parts can be burred as fast as they can be handled by the operator.
4. NOBUR stops waste of vital materials—eliminates re-works and rejects in assembly—cuts burring time to an absolute minimum and makes the burring of holes a machine operation.
5. NOBUR is available in 1/16" progressive sizes from 3/16" to 1" diameter.

NOBUR definitely increases the production of finished parts! Write today for complete information!

Note how readily
NOBUR is used to burr
curved surfaces.

Multi-walled part is
easily and quickly de-
burred on all surfaces.

NOBUR MANUFACTURING COMPANY
908 NORTH ORANGE DRIVE LOS ANGELES, CALIFORNIA

**Get the Benefits of
MOBILE Power for**

*Grinding
Sanding
Wire Brushing
Drilling
Buffing
Polishing
Filing*



STOW

**FLEXIBLE SHAFT
MACHINES**

*Speed Output
Save Labor
Cut Costs
Work Anywhere*



● 68 years of leadership in the manufacture of flexible shafting is your best assurance that STOW claims will become realities in actual service. When you specify STOW, you specify highest quality, longest life, best performance. Compare! Get all the facts. Ask for literature and nearest dealer's name.

● STOW Flexible Drill-Shafts, with straight spindle or angle heads, reach the hard-to-get-at spots. The handy way to drill true holes fast.

STOW

MANUFACTURING CO.

1 Shear St.

Binghamton, N. Y.

GRENBY

*Makes a full line of
Precision Grinders*



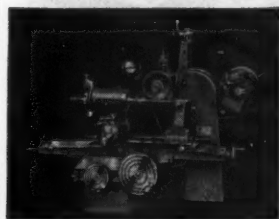
**EG-10
EXTERNAL**

Power or Hand Feed
8" Between Centers

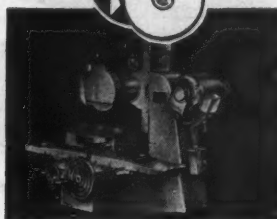


**IG-10
INTERNAL**

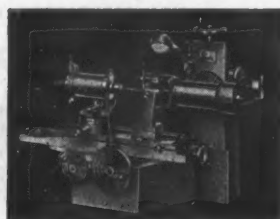
Power or Hand Feed
Grinds 1/8" to 3" Holes



FG-1 FLUTE GRINDER



S-1 SURFACE GRINDER



TRS-1 CUTTER GRINDER

H A N D F E E D O N L Y

THE GRENBY MANUFACTURING CO., PLAINVILLE, CONN.

THE FOUNDATION FOR UNIFORM MEASUREMENT

DO-ALL Gage Blocks

Today $1/10,000$ of an inch variation in size is enough to reject a whole shipment of parts. So, each plant must become its own Bureau of Standards by using Gage Blocks.

Each DO-ALL set consists of 81 basic blocks, which assemble into any one of a hundred thousand precision sizes to check other gages, dies, micrometers, jigs, fixtures, parts, etc.

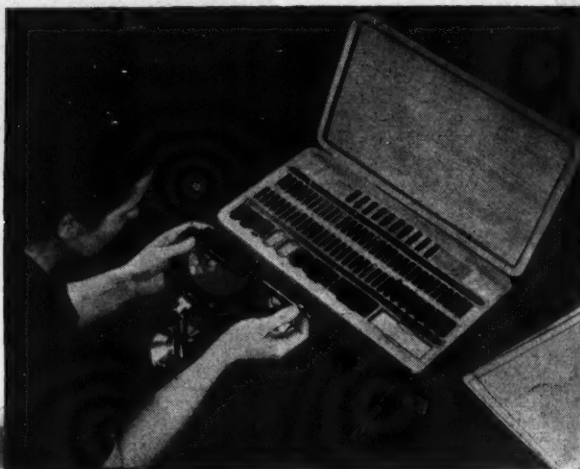
WORKING SET, accurate to 8 millionths of an inch\$295.00

INSPECTION SET, accurate to 4 millionths of an inch\$350.00

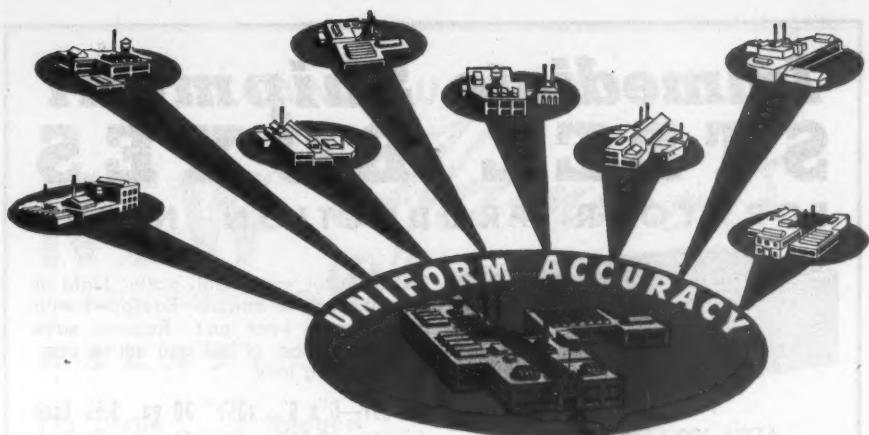
***LABORATORY SET**, accurate to 2 millionths of an inch\$1450.00

DO-ALL GAGE INSPECTION LABORATORY, including Inspection Set of Gage Blocks ..\$975.00

**Recommended for use in a room with temperature controlled at 68° F.*



Checking a 6" Micrometer.



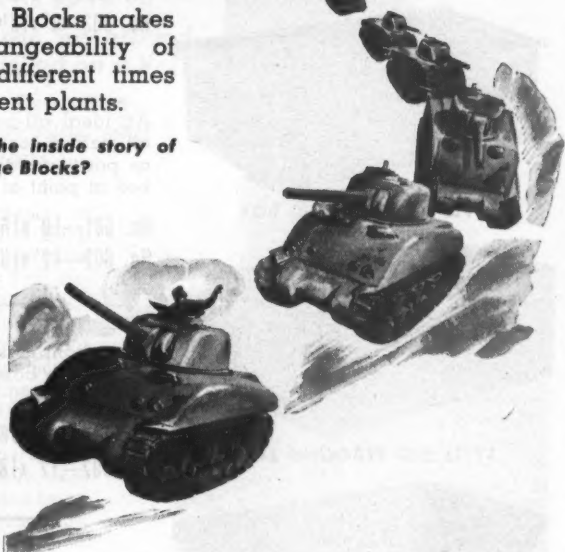
The use of Gage Blocks makes possible interchangeability of parts made at different times and in different plants.

May we send you the inside story of DO-ALL Gage Blocks?

FREE

SOUND SLIDES

The care and use of Gage Blocks is one of the least understood phases of production. The DO-ALL man in your locality will gladly bring his portable projector and show a series of instructive slides to your Tool Room, Inspection and other Departments.



SAVAGE TOOL COMPANY

DEPT. MM, SAVAGE, MINNESOTA

DO-ALL Offices in 25 cities, with a staff of trained engineers to give you quick service on DO-ALL Gage Blocks, Surface Grinders, Contour Machines, Band Saws and Files.

Immediate Shipment STEEL BOXES

FOR YOUR PRODUCTION NEEDS



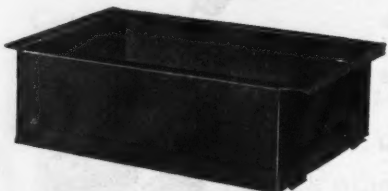
STYLE 300 STACKING BOX

Just right for your small parts. Light in weight, easy to handle. Equipped with drop handle each end. Runners save wear on bottom of box and act as positive stacking lock.

No. 301—6"x 9" x3½" 20 ga., \$.55 Each

No. 302—8"x12" x4" 20 ga., .60 Each

No. 303—9"x13½"x4½" 19 ga., .75 Each

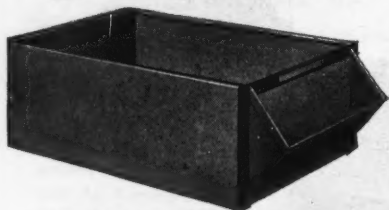


STYLE 600 STACKING BOX

An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as positive stacking lock and re-inforce box at point of maximum wear.

No. 601—10"x16"x6" 18 ga., \$.95 Each

No. 602—12"x18"x8" 16 ga., 1.25 Each

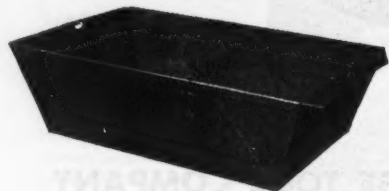


STYLE 500 STACKING BOX

Open front makes contents easily accessible when boxes are stacked. Will stack with Style 600 Boxes.

No. 501—10"x16"x6" 18 ga., \$1.15 Each

No. 502—12"x18"x8" 16 ga., 1.50 Each



STYLE 100 TAPER PAN

One piece, all-welded construction. Hook handle at each end. Will nest perfectly when empty.

No. 101—10"x18"x6" 18 ga., \$.75 Each

No. 102—12"x20"x8" 16 ga., .90 Each

Prices F.O.B. Factory, Philadelphia—Any Quantity! Order Today—Write, Wire or Phone.

AMERICAN METAL WORKS, INC.

1501 GERMANTOWN AVENUE

PHILADELPHIA 22, PA.

ANNOUNCING

NEW *Hammond* 10" WET-N-DRI

ABRASIVE BELT GRINDER

- (1) **Large . . . Rugged
for Abrasive Belts up to 10"**
- (2) **Any material can be ground,
surfaced or finished on a V-10**
- (3) **For Deburring, Descaling,
Chamfering, Beveling and
similar operations.**

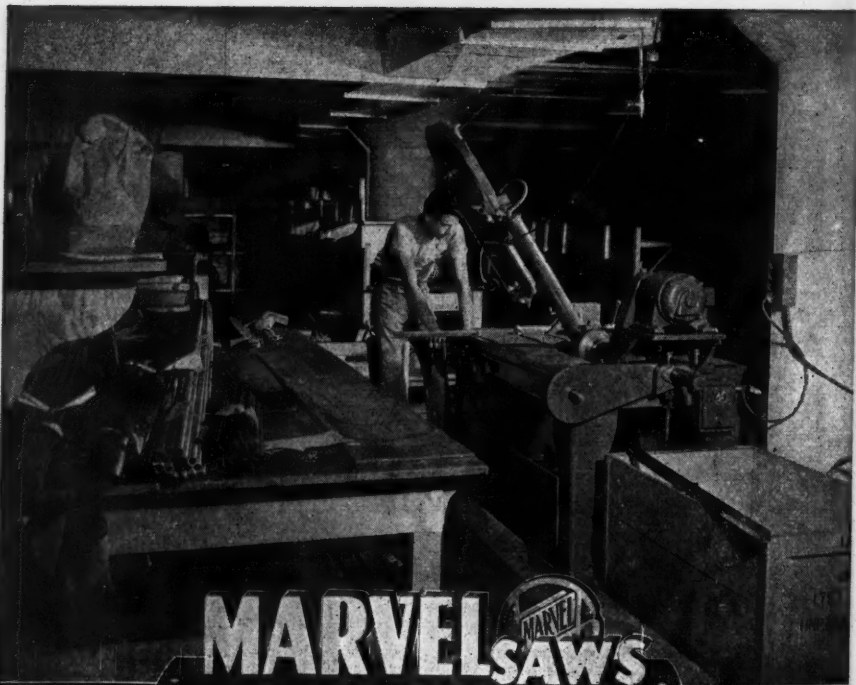
With many years experience as a background Hammond of Kalamazoo now presents an abrasive belt grinder of Machine Tool design, construction and quality. Because of its size (taking up to 10" belts and weighing over a ton) its heavy, precision construction no other belt machine is its equal for a wide variety of deburring, descaling, chamfering, beveling and similar operations. Accuracy within reasonably close tolerances can be depended upon. Write today for full particulars.



1615 DOUGLAS AVE.

Eastern Branch
71 West 23rd Street, New York 10, N. Y.

SEND TODAY FOR
BULLETIN 302



MARVEL SAWS

For steel tubing they use a MARVEL No. 8 Band Saw at Douglas Aircraft

You'll find different types of MARVEL Saws in the giant Douglas Aircraft Plant at Santa Monica each doing work in which it surpasses all other saws. Take the MARVEL No. 8 shown above, it has proven "an excellent piece of equipment" for cutting-off steel aluminum and aluminum alloy tubing of many types and sizes in innumerable lengths and at all angles because the blade can be fed to the work at any angle from 45° right to 45° left.

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave., Chicago, U.S.A.

Eastern Sales Office: 225 Lafayette St., N. Y.

No. 9A
Automatic
Bar Feed
10" x 10"

No. 8
Metal
Band Saw
10" x 10"

No. 18
Capit
Feed
10" x 10"

No. 1
Cap. 4" x 4"

No. 2
Cap. 6" x 6"

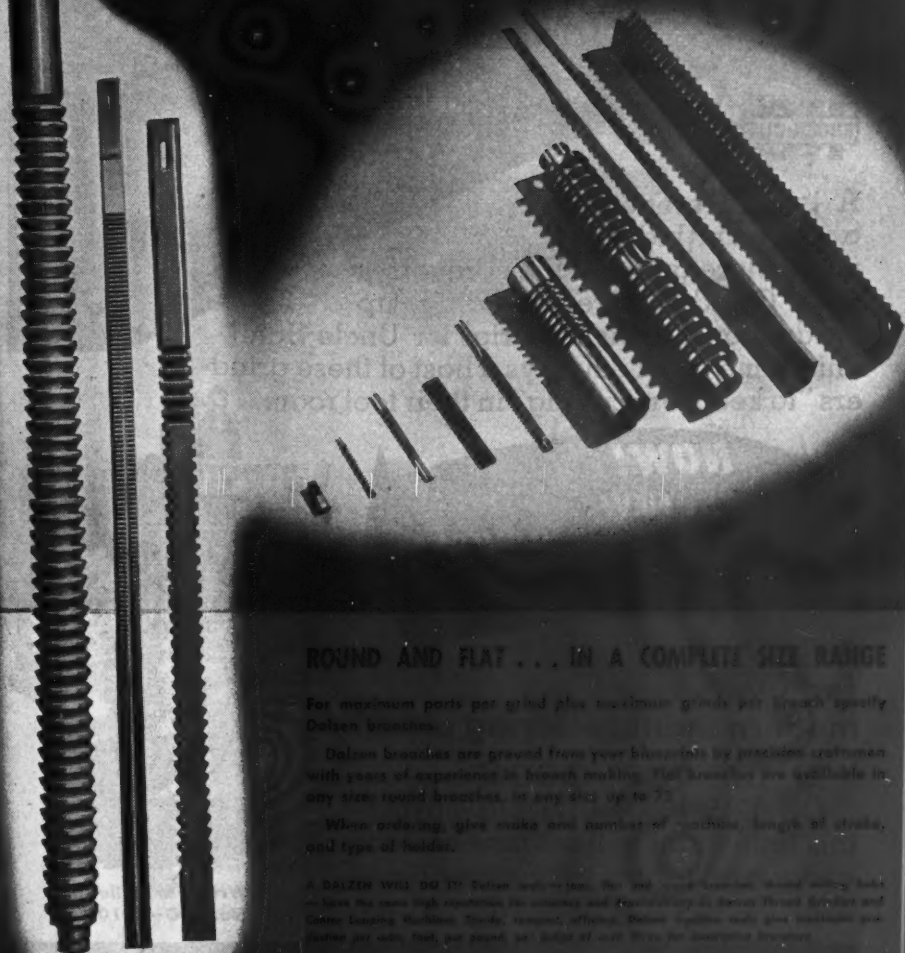
No. 4B
Light Duty
High Speed
Cap. 6" x 6"

No. 6
Heavy Duty
High Speed
Cap. 6" x 6"

No. 6A
Automatic
Bar Feed
Cap. 6" x 6"

No. 7
Heavy Duty
High Speed
Cap. 10" x 10"

DALZEN *Broaches*



ROUND AND FLAT . . . IN A COMPLETE SIZE RANGE

For maximum parts per grind plus maximum grinds per broach specify Dalzen broaches.

Dalzen broaches are ground from your blueprints by precision craftsmen with years of experience in broach making. Flat broaches are available in any size; round broaches, in any size up to 72.

When ordering, give make and number of cuts, length of stroke, and type of holder.

A DALZEN WILL DO IT! Dalzen will make the best round broaches, round milling tools — from the most high condition to economy and low delivery to Dalzen Thread Broaches and other broaching machines. Trade, request, estimate. Dalzen broaches really give maximum production per unit, fast, and good, at a price of cost. Write for descriptive literature.

DALZEN BROACHES

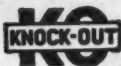
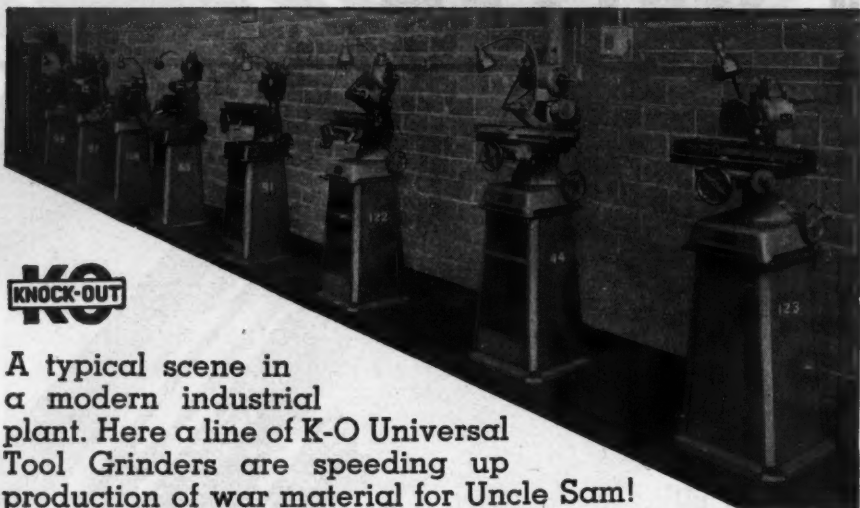
Round broach parts are being produced in quantities for broaching, reaming, and grinding. For detailed data on the series, select broaches and specify that when writing inquiry.

DALZEN

TOOL & MANUFACTURING CO.

12255 EAST 8 MILE ROAD

DETROIT



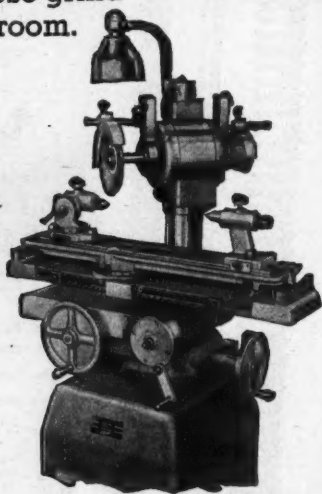
A typical scene in a modern industrial plant. Here a line of K-O Universal Tool Grinders are speeding up production of war material for Uncle Sam! This same plant employs a host of these grinders "to keep 'em cutting" in their tool room.

NOW!

The NEW
Knock-Out UNIVERSAL
TOOL GRINDER!
Deliveries Three Weeks.

A "MUST"
for every
modern manufacturing plant!

IN THE TOOL ROOM
ON THE PRODUCTION LINE,
this little giant will set new records
and make its own way many times
over.



Write for Bulletin
No. UTG-43-10M.

THE K. O. LEE CO.
ABERDEEN SOUTH DAKOTA

for **QUICK**
change-overs

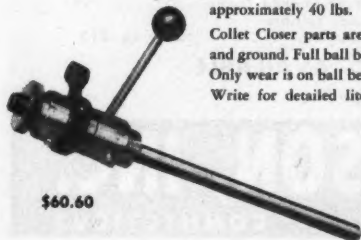
\$197.50
Immediate
Delivery



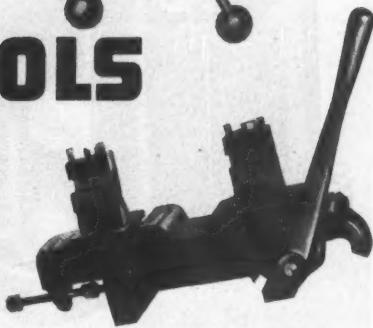
UTILITY TOOLS

In a matter of minutes you can convert your engine lathes into screw machines. Simply remove tail stock and install a Utility Turret and Crossfeed Cut-off. Turret has rack and pinion which assures steady feed. Raised bearing surface eliminates all chip trouble. Has two taper gibs for take-up and alignment. All ways and bearing surfaces are ground. All inserts, bushings and pins are hardened and ground. Hex is $5\frac{1}{4}$ " across flat, 2-7/16" thick. Accommodates a $\frac{3}{4}$ " hole or a No. 1 or 2 Morse taper. Fits Logan, South Bend, Atlas, Craftsman, 10" Sheldon, Clausing, etc. Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

Collet Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature.



\$60.60



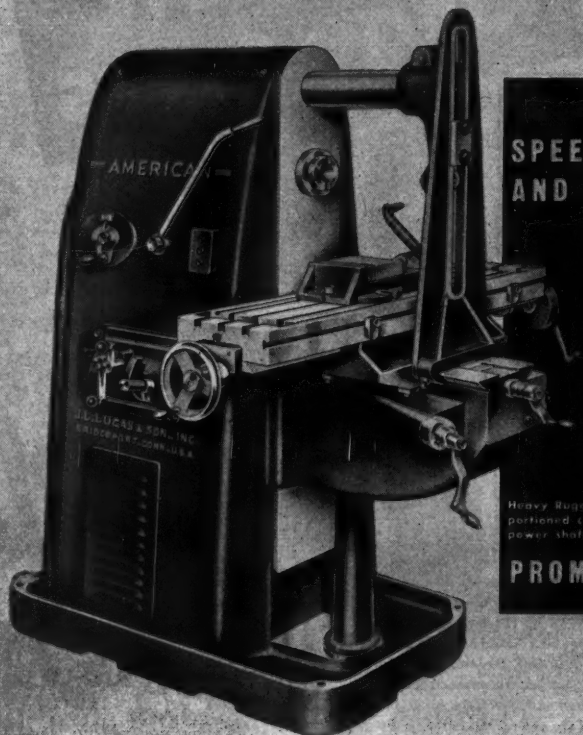
\$55.00



TOOL and DIE MFRS.

1370 West Washington Blvd.
LOS ANGELES 7, CALIFORNIA

American No. 2 PLAIN MILLING MACHINE



for
**SPEED, ACCURACY
AND VERSATILITY**
in
**ARMAMENT
PRODUCTION**

Infinite Spindle Speeds—
25 to 500 r.p.m.

Standardized Spindle Nose
Spindle heat-treated
chrome-nickel steel with
No. 40 taper

Motor in Base Drive—3 hp
U-S. Vari. Drive motor
Twin-Disk Duplex Machine
Tool Clutch

Heavy Rugged Construction—Heavily pro-
portioned column houses motor drive and
power shafts

PROMPT DELIVERY

Spindle is heat-treated chrome-nickel steel and runs in heavy phosphor bronze bearings compensated for wear and equipped with alemite lubrication fittings. Standardized flange spindle nose has No. 40 taper. Controls for speed and feed are centrally located for ease of operation.

Table working surface.....46" x 10 1/4"
Longitudinal power feed......25"
Transverse power feed......9"
Vertical hand feed......19"
Max. distance spindle to table.....19"
Number of geared feeds......16
Range per spindle
revolution......005" to .212"

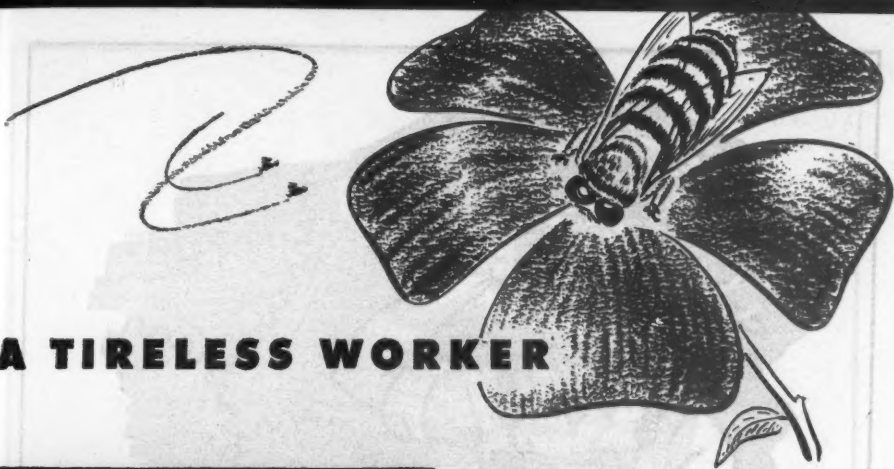
UNIVERSAL MODEL ALSO AVAILABLE

WRITE FOR FOLDER

J. L. LUCAS & SON, INC.

BRIDGEPORT

CONNECTICUT



A TIRELESS WORKER


BUILT FOR ROUND THE CLOCK OPERATION

Designed for greater efficiency . . . lighter weight, increased power, improved handling and long punishing service.

A Size for Every Need . . . Heavy Duty 1", $\frac{3}{4}$ ", $\frac{5}{8}$ ", $\frac{1}{2}$ " (2), $\frac{3}{8}$ " (2), $\frac{1}{8}$ ", $\frac{1}{4}$ " Low Speed. Special $\frac{1}{4}$ " All Angle.

Ask your **SIoux**

Distributor
or
write for
details.



SIoux

ELECTRIC DRILLS

STANDARD THE

WORLD OVER



A screw loose?



UNBRAKO

Reg. U. S. Pat. Office

**Self-Locking
Hollow-Set Screws
with KNURLED
Points**

*Knurling of Socket Screws
originated with "Unbrako"
years ago.*

Yes, but... don't get this wrong—it's the machine that has a screw loose, not the mechanic. He only looks that way because he has so many machines to watch over and keep in repair . . . and with screws working loose and causing slow-ups, faulty performance, accidents, etc., it's enough to drive any mechanic crazy. So unnecessary, too. If machines had been equipped with Knurled "Unbrakos," you'd see a different picture altogether.

"UNBRAKO" HOLLOW-SET SCREWS WITH KNURLED POINTS are self-locking, vibration-defying—they stay put once they've been tightened into place and eliminate unnecessary loss of valuable time and labor, reduce maintenance costs and worries, minimize safety hazards.

Remember to specify Knurled "Unbrakos." Sizes: No. 4 to 1½" diameter. Send for the "Unbrako" Catalog today.

OVER 40 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. 19033 BRANCHES: BOSTON · DETROIT · INDIANAPOLIS · CHICAGO · ST. LOUIS · SAN FRANCISCO

SHIPPED AT PEACE-TIME SPEED

GILBARCO COOLANT PUMPS are made by one of the country's largest pump manufacturers for all machine operations. Rugged and durable, they are built for 24 hours a day service.

STANDARD MOTORS Pumps with motors for all regular voltages and cycles, two or three phase, shipped promptly.

SPECIAL MOTORS Facilities for winding motors for unusual electrical characteristics enable us to ship almost as promptly as standard units.

Write or wire for literature and prices



GILBERT & BARKER MFG. CO.

WEST SPRINGFIELD, MASS.



Woody Spencer
says...

**"TAPS ARE PRECISION
TOOLS —
TREAT THEM AS SUCH!"**

(No. 3 in a series of WOOD & SPENCER "KNOW HOW" messages)

Today's vastly increased production demands combined with a shortage of replacement tools behoove every workman to become tool-conscious. For example; the proper selection and careful use of taps will show production results far beyond normal expectations. We have listed here 5 suggestions designed to aid you in using taps.

1. Keep cutting edges sharp—even stoned for fine cuts. Dull edges turn out poor work and increase tap-breakage.
2. Spiral Pointed Taps are strongest. If properly used, power required to break them is many times greater than that required to tap.
3. A tap out of alignment with the hole to be threaded will always cause a bell-mouthed hole.
4. A tap out of alignment greatly increases the power requirements and sets up cramping strains likely to break the tap.

Increase production by applying these suggestions to your jobs — and write to us for help in solving special tapping problems.

**FROM CUSTOMERS' BLUEPRINTS WE QUITE
FREQUENTLY MAKE RECOMMENDATIONS FOR**



"THE RIGHT TAP AT THE RIGHT TIME"

The Wood & Spencer Company
Cleveland, Ohio

PROSSER

CARBIDE GRINDERS

● Modern, streamlined grinders for most rapid rough grinding and finest finishing of carbides, stellite, high speed steel, and other modern tools. Bench and floor type machines, of several capacities, for wet or dry grinding, as desired. Attachments for chip breaker and drill grinding.

FEATURES OF PROSSER GRINDERS

- Quick-acting indexing tables.
- Adequate wet - grinding equipment.
- High grade ball bearing spindles.
- Oversize wheels, giving longer wheel life, and permitting grinding of larger tools.
- Moderate price.

**Prompt Deliveries
Write for Details**

MODEL
AA



MODEL
EE



Thomas Prosser & Son
10 WALL STREET NEW YORK

OVER 20 YEARS OLD

... accurate as a new tool

With scraping of the ways, minor part replacements, and an EX-CELL-O PRECISION SPINDLE, this grinder was brought back to new life at a minimum of cost.

EX-CELL-O CORPORATION • DETROIT

Send for Catalog S-537 for list of grinding machines on which Ex-Cell-O Precision Spindles are used as standard original or replacement equipment.



XLO

EX-CELL-O for PRECISION

EX-CELL-O GRINDING
Precision SPINDLES

Show your

SET-UP MAN THIS

ALCO

**HOLLOW MILL
HOLDER**

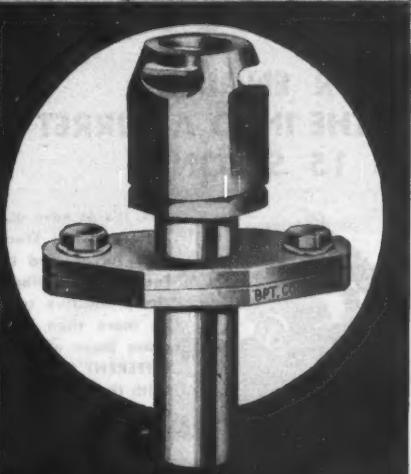


Here is a tested and proven improvement in hollow mill holders over old fashioned types. You're interested in saving time these days; here's how the ALCO Hollow Mill Holder will do it . . . Only one wrench is necessary to tighten the nut which holds the hollow mills. Position the mills on the work and tighten the studs on the flange of the holder and you are in absolute concentricity.

Better work . . . complete finish in one operation comparable with box tool turning.

Longer life . . . patented internal bearings ground entirely true with the shank bring the hollow mills to exact position so they cut on all lands assuring longer life to your tools.

WRITE FOR COMPLETE CATALOG.



ALCO **EFFICIENT** **TOOLS**

THE ALCO TOOL CO.

152 BIRDSEYE ST.
BRIDGEPORT, CONN.

Detroit: 908 Stephenson Bldg.

Chicago: 6219 S. Kenwood Ave., Hyde Park 6807



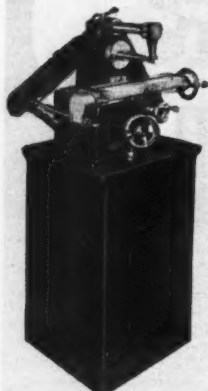
Photo above shows Jefferson Turrets on 16" lathe

Convert

YOUR ENGINE LATHE INTO A TURRET LATHE IN 15 SECONDS



5-Tool Tail-Stock Turret



We also Manufacture the Jefferson Bull Dog Precision Milling Machine.

DELIVERY 3 WEEKS

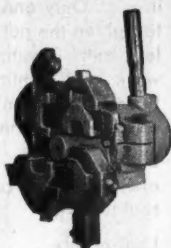
Yes, it's as easy as that! You simply attach the Jefferson Tail Stock Turret, the Jefferson Tool Post Turret, and the Jefferson Adjustable Pull Feed to your lathes as shown in illustration.

The productive capacity of these machines will be more than doubled in many instances because there will be available at all times **NINE DIFFERENT TOOLS**.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe, or changing tools. THE JEFFERSON TURRETS are made very substantial, rigid, accurate and in several sizes to fit small bench lathes up to 24" swing.

Jefferson Turrets are real production tools — substantial, rigid, accurate and adaptable to any size or make of engine lathes. They must not be confused with the small makeshift gadgets now on the market.

PAT. PENDING



4-Tool Tool-Post Turret

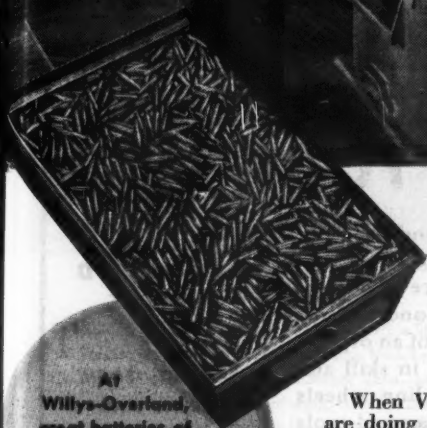
TURRET DELIVERIES IN 6 DAYS

JEFFERSON MACHINE TOOL CO.

750 W. Fourth St., Cincinnati, Ohio

Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Belt Sanders, Gyrotray Foundry Riddles, Overhead Swing Frame Grinders, Milling Machines, Dividing Heads and Vises.

IN AMERICA'S GREAT PRODUCTION PLANTS...



At
Willys-Overland,
great batteries of
Acme-Gridley Multiple
Spindle Automatics are
tirelessly producing
millions of ammu-
nition parts

Plenty— AND AHEAD OF TIME

When Victory comes, the Acme-Gridley Automatics that are doing such a big job in producing an endless supply of fighting equipment and ammunition, will be ready to work on the products of peace.

These Automatics are not merely one-purpose war production machines. They are versatile—adaptable. Retooled, they will turn out the parts for new and better cars, trucks, planes, farm machines, household appliances and business equipment—precision parts in unlimited quantity, at new lower costs!

Acme-Gridleys operate at speeds as high, and feeds as fast, as modern tools will withstand.

NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

ACME-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING, DIES AND TAPS • THE CHRONOLOG • LIMIT AND CONTROL STATION SWITCHES • SOLENOIDS • CENTRIFUGES • CONTRACT MANUFACTURING

Engineered Diamond Tools!



DESIGNED TO GIVE BETTER PERFORMANCE AT LESS COST ON YOUR JOB!

The accuracy, precision, dependability and long life built into diamond tools by Wheel Trueing Tool Company are the result of 33 years' experience in designing, developing and manufacturing diamond tools of fine quality. These tools are the products of an organization of diamond engineers unexcelled in skill and experience—craftsmen who know grinding wheels and the application of diamonds and diamond tools to all types of production jobs.

It is no wonder that more and more production men interested in faster and more economical production are specifying diamond tools engineered to their jobs by Wheel Trueing Tool Company.

★
**DIAMOND
TOOLS
for**

**STRAIGHT, FORM,
THREAD AND
RADIUS DRESSING;
TURNING, BORING,
GAGING AND
CORE DRILLING**

★

WHEEL TRUEING

3200 W. DAVISON

TOOL COMPANY INCORPORATED

DETROIT 6, MICH.

Flexible Shaft Machines will do it
QUICKER... BETTER

AND HASKINS WILL DO IT LONGER

THERE'S NO END of jobs for Haskins Flexible Shaft Equipment around a machine shop, foundry or die shop. Haskins makes 30 different units—each engineered for a single type of work, but capable of doing many kinds of jobs. So broaden your use of Haskins Flexible Shaft Machines. You can't get them down. You can get lower costs per man and machine hour. Catalog 45 shows many ways to speed production with flexible shaft equipment. Write for a copy. R. G. Haskins Company, 619 S. California Avenue, Chicago.

European Representative: G. E. Marbaix, Ltd., Humber House, London, S.W.1.



TYPE HS-7
1 H.P. heavy
duty unit
with multi-
speed counter-
shaft
drive.



HASKINS
Flexible Shaft
EQUIPMENT

More **VERSATILE** Machines for
More **PROFITABLE** Work

BIG FELLOWS OR LITTLE FELLOWS—Haskins has what it takes to do the job—and to keep on doing it. The right mounting. The right power. The right drive—direct or multi-speed countershaft—for sanding, polishing, heavy duty grinding, rotary filing and wire brushing.

Announcing

ABRASIVE

Plain Milling Machine



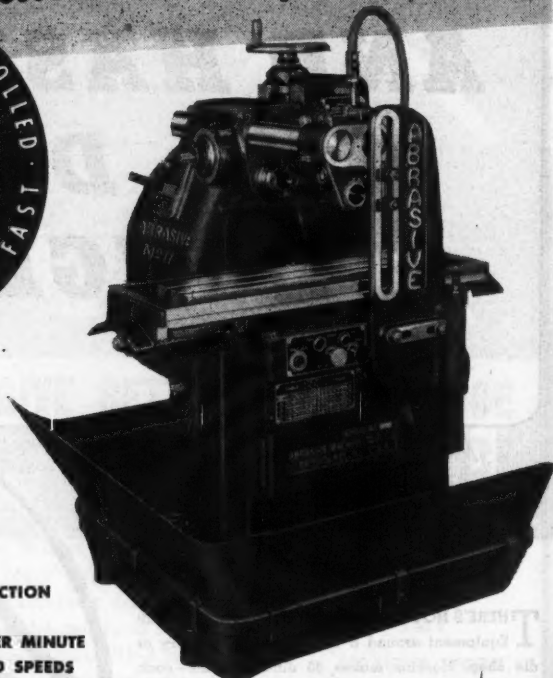
Features

FULL ELECTRICAL CONTROL
SMOOTH, QUIET OPERATION
FLEXIBLE, EFFICIENT
PERFORMANCE
EASY OPERATION
SAFETY FEATURES
LOW MAINTENANCE COSTS
CLIMB MILLING IN EITHER DIRECTION
AUTOMATIC REVERSE
FAST TABLE TRAVEL OF 300" PER MINUTE
WIDE SELECTION OF FEEDS AND SPEEDS

Designed and developed recently by Brown & Sharpe Mfg. Co., this new manufacturing-type milling machine is made by ABRASIVE to ABRASIVE's high standards. It is exceptionally compact, rugged and flexible... provides complete electrical control for table and spindle power movements and a capacity ample for most work of medium size. Engineered for easy operation and high production, this new machine answers ideally all ordinary milling requirements.

No. B-11 provides wide variety of automatic operating cycles. Electric station and dogs control all power table movements.

For complete details and specifications write for descriptive bulletin.



ABRASIVE MACHINE TOOL CO.

Dealers in Principal Cities

EAST PROVIDENCE

RHODE ISLAND

New **Speed Control VALVE** *provides* **SPLIT-SECOND TIMING**

Precise timing of piston movements is now assured by the new Ross Full Capacity Air Speed Control Valve.

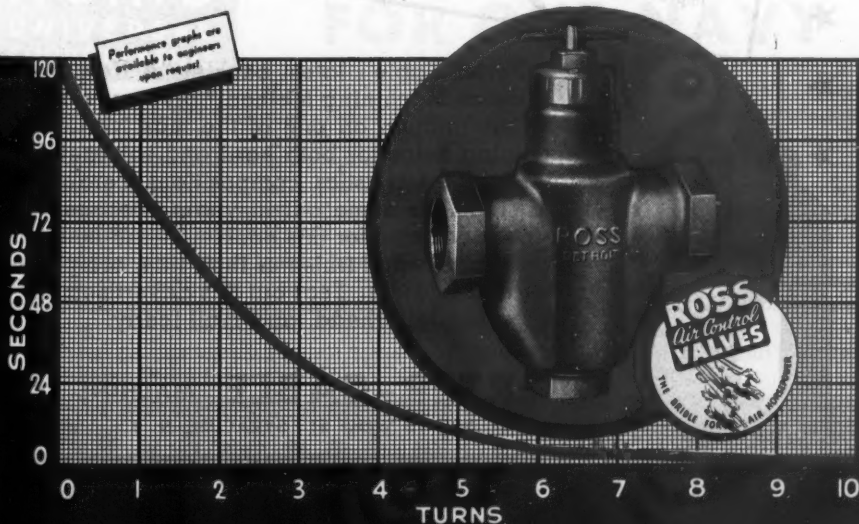
A greatly increased range of piston speeds is obtainable through control of air flow from maximum down to zero.

Finer and more accurate speed settings are obtained through a vernier-like adjustment mechanism.

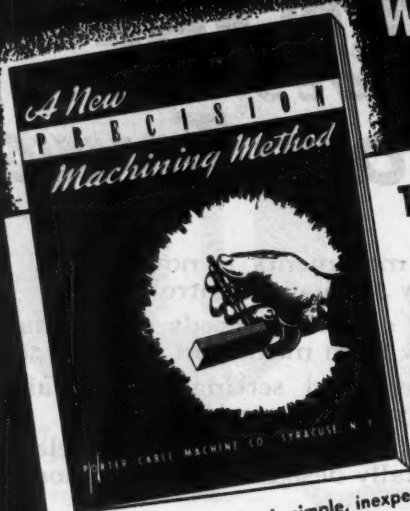
Positive, steady control is maintained, at any selected speed, by means of a specially designed stem and floating bevel seat poppet.

ROSS Operating VALVE CO.

6484 EPWORTH BLVD. • DETROIT, MICH.



Send for the Complete Story of WET-BELT SURFACING



The Proved Finishing Method that . . .

- produces superior work, 5 to 25 times faster than previous methods.
- holds close limits, often .0005".
- works an entire area at once.
- eliminates dust or grit, injurious to other equipment and to health.
- eliminates heat, warping, distortion, discoloring, fracturing, chipping.

- needs fewer, and only simple, inexpensive jigs.
- cuts set-up time and lock-up time — often eliminates both entirely.
- reduces cost of equipment, operation and maintenance.
- permits inexperienced workers to get increased production and superior finish.
- replaces other machine tools on many operations, and supplements others to improve results.

Porter-Cable's latest booklet "A New Precision Machining Method," gives you complete information on one of the most valuable machining helps for both hard and soft metals, stainless steel, plastics, compositions, ceramics, glass, that has come out in years. Because of the great demand for this booklet, it can be sent only to those who furnish us their title, company name and address. Tear out this advertisement, clip to your letterhead, and mail today.



PORTER-CABLE MACHINE CO.
300-10 WOLF ST., SYRACUSE, N. Y.

ALL OUT PRODUCTION



Cincinnati
ACME
UNIVERSAL
TURRET LATHES

FOR OUR NAVY

● Here is a 18-25" Cincinnati Acme Universal "Cross Sliding" Turret Lathe producing valve bodies for a leading valve manufacturer. This plant is on an all out 24 hour a day schedule building special service valves for our Navy.

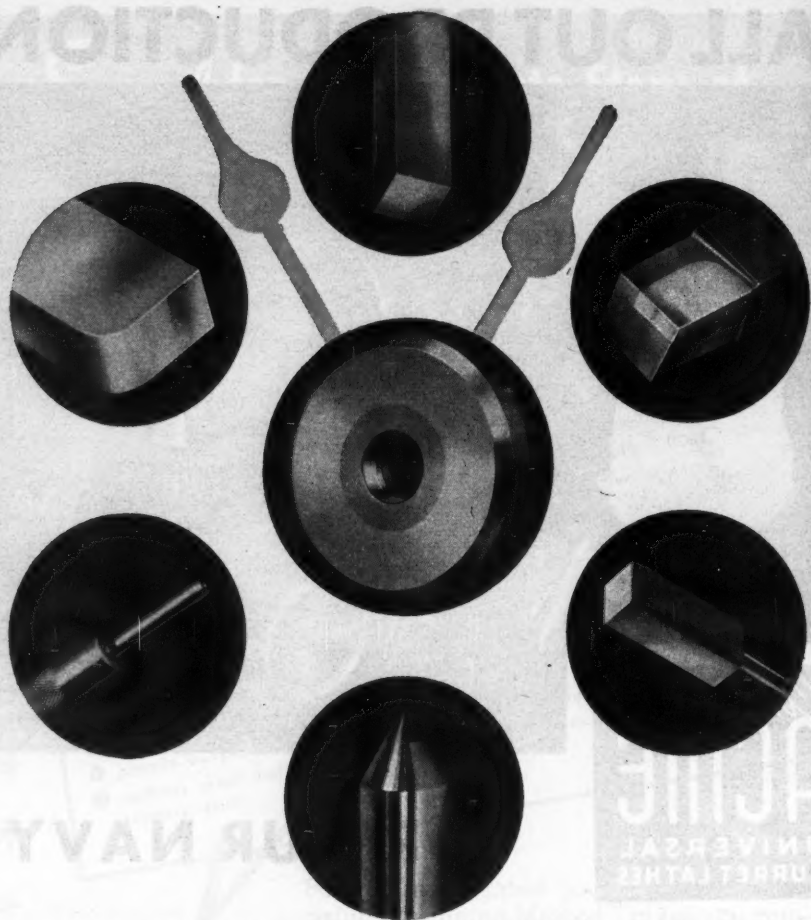
The Acme Turret Lathe shown is especially adapted to this type of work requiring large swing. This is typical of the type of service Acme Turret Lathes are performing in many of our War production plants on a round the clock schedule!

Acme Universal Turret Lathes have the power and rigidity to stand up over long periods on tough jobs requiring carbide cutting tools. They have wide feed and speed ranges for fast, productive cutting and are meeting a wide variety of production demands, quickly, accurately and economically.

Try them on one of your turret lathe jobs. Bulletin G-102 will give full detailed description. Write for one.

ACME

MACHINE TOOL CO.
CINCINNATI, OHIO



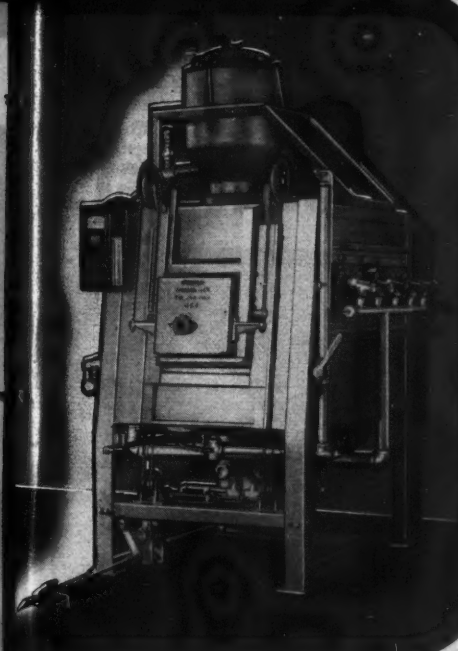
WAR-PRODUCTION TOOLS

Tamalay tungsten carbide tools
Speedaloy cutting tools

Tools, dies, lathe centers, hones
Tamalay carbide blanks.

TUNGSTEN ALLOY MFG. CO.

65 COLDEN STREET, NEWARK 4, N. J. formerly Circle Tip Tool Co.



**SURFACE
COMBUSTION**

CHAR-MO

**SAFE, SIMPLE
ATMOSPHERE FOR
SENSITIVE STEELS**

No Scale • No Decarb • No Soft Skin!

★ The operation of the Surface Char-Mo Furnace atmosphere generator is simple. All that is necessary is to load charcoal hopper, control air flow by one valve and remove ash by means of simple grate mechanism. Composition of atmosphere is automatically controlled by the furnace temperature.

★ Incorporation of atmosphere generator in the heating chamber of the Surface Char-Mo Furnace reduces equipment cost by eliminating a separate generator and extra set of temperature controls. There

are no complicated meters...no elaborate proportioning devices.

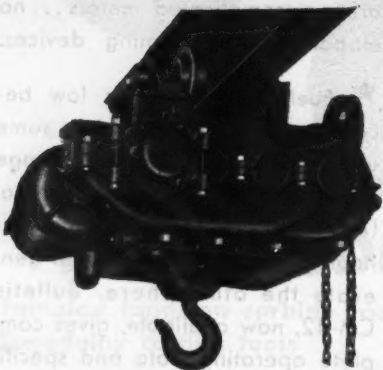
★ Fuel consumption is low because generator is built into same unit as furnace muffle. An average of three to five pounds of charcoal (any local commercial source) per hour is all that is required to generate the atmosphere. Bulletin CM-42, now available, gives complete operating data and specifications. Write for your copy.

**SURFACE COMBUSTION
TOLEDO, OHIO**

SURFACE COMBUSTION

INDUSTRIAL FURNACES • JANITROL GAS-FIRED SPACE HEATING EQUIPMENT • KATHABAK MOISTURE CONTROL SYSTEMS

Industry's Air Transport *Northern* Cranes and Hoists



For years industry has known what the army and navy are just discovering—that materials may be moved through the air with ease and dispatch.

Industry moves materials through the air with reliable cranes and hoists. Speed, safety, and clear pathways are always available.

Northern Cranes and Hoists are contributing much to industry's air transport in these busy times.

Northern Hi-Lift Hoists are built in 1000 lb. to 15-ton capacity—in single motor and two-motor types.

Write for New Catalog of Hi-Lift Hoists

NORTHERN ENGINEERING WORKS

General Office: 2601 Atwater St., DETROIT, MICH.

NORTHERN CRANE & HOIST WORKS, Limited • WINDSOR, CANADA

**Offices at—913 South 38th St., BIRMINGHAM • 53 West Jackson Blvd., CHICAGO • 2428 Spring Grove, CINCINNATI • 5724 Navigation Blvd., HOUSTON • 44 Whitehall St., NEW YORK
547 Union Trust Bldg., PITTSBURGH • 4135 Gratiot Ave., ST. LOUIS • 1679 University Ave., ST. PAUL**

DOUGLAS PRECISION MILLER

for Toolroom
and Production

Size 32" x 8"
Plain



THE PRECISION BUILT INTO THE DOUGLAS MILLER



provides efficiency and speed to produce small parts requiring the extreme accuracy essential for war production.

Rigid well balanced design, combined with central control make for easy operation, permits the release of highly skilled labor for other tasks.

A wide selection of speeds meets all requirements for toolroom and production.

There is an ample variety of feeds from which to choose the right feed for material and accuracy requirements.

Timken bearings and helical drive gears are other features to assure a smooth performance. Write today for specifications and prices.

PROMPT DELIVERY

DOUGLAS MACHINERY CO., Inc.

150 BROADWAY

NEW YORK, N. Y.

Whether it's an 0-80 or 4" tap
you can forget breakage with
BAKEWELL

Tap breakage—material scrapping—lost manhours—all are forgotten with a Bakewell Precision Tapping Machine. The exclusive Bakewell sensitive clutch is adjusted to the safe torsional resistance of the tap. When the tap strikes chips or becomes dull, the clutch automatically slips. The operation halts. The tap is saved. You gain as much as 300% greater tap life. You save irreplaceable time, dollars and material by eliminating rejects formerly caused by taps breaking in blind holes. . . . There's a Bakewell Tapping Machine for any size hole—from 0-80 to 4 inches—that will give you any precision fit in any material with one pass.

Send today for
new specifica-
tion booklet



BAKEWELL MANUFACTURING CO.

2009 SANTA FE AVE. • LOS ANGELES 21, CALIF.

**FOR FINER
FASTER FINISHING**

Use **DREMEL** Moto-Tools

Model 2 Moto-Tool, complete with accessories, as illustrated, in felt-lined hard-wood case—\$23.50. Model 2 Moto-Tool only, with emery wheel point—\$16.50.

**27,000
R.P.M.**

Used in machine shops and tool rooms for finishing intricate dies, third or production runs to clean castings, burrs and forgings—sharpen tools, and do hundreds of grinding, finishing, polishing, boring, reaming and sliding operations.

Dremel Moto-Tool has AC-DC motor with shock-proof ball-bearing housing, oil-lubricated (2000) bearings, and built-in cooling fan. Weighs only 12 ounces—so light and compact a job can handle it with ease. Dynamically balanced armature eliminates vibration and provides precision control. Moto-Tool's high speed (27,000 rpm) permits finer, faster work—conserves effort.

Dremel Moto-Tools are proving indispensable aids in speeding up war production in such plants as General Electric, Westinghouse, Rem-

ington Arms, Ford, Mack-Caldwell, General Motors, Alamo, Douglas and Hercules Aircraft, and many similar factories of America.

10 DAY TRIAL

Try a Dremel Moto-Tool on your own job—in your own shop. See how accurate, how indispensable it becomes in saving time and materials. Order from your distributor. If he cannot supply your service factory, WE'LL SHIP IT to you with prompt delivery.

Whether you have a Moto-Tool or any other type of grinder, we only handle Dremel shop-tested Accessories—also listed.



DREMEL MFG. CO. T-223-K RACINE, WIS. U.S.A.



FOR FASTER FINISHING

A POSTWAR INVESTMENT

The same O K Tools now helping you to meet war schedules, save man-hours and conserve high speed steel, will be right there on the job when the immense task of meeting civilian needs begins. The only wearable parts are the cutting edges. These can be quickly reground, or renewed at small cost, bringing the tool back to 100% efficiency. The bodies and the standard blades will be a permanent investment.

**"OK"
FOR EVERY
METAL CUTTING
JOB**



INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

MANUFACTURED ONLY BY THE O K TOOL COMPANY, SHELTON, CONN., U. S. A.



**7 PIECES PER HOUR
INSTEAD OF 5**

SUNOCO EMULSIFYING CUTTING OIL

...boosts cutting tool life 40%...speeds production...improves finish

Here's one plant where vital parts for war machines are being produced in almost half the time it used to take . . . thanks to Sunoco Emulsifying Cutting Oil.

According to reports slow speeds were necessary because of excessive heating and smoking. Tools wore rapidly. Cutting oil costs were high. Then a Sun Doctor of Industry was called in. At his suggestion a switch was made to Sunoco. In one week, results were remarkable. With Sunoco's high heat-absorbing and lubricating qualities, speeds were increased. Seven parts were produced each hour instead of the former five . . . making possible 16 "extras" per day

with no increase in tool grinding. Finishes were noticeably finer. And all at a saving of 10% in cutting oil cost.

This is only one of many cases where Sunoco Emulsifying Cutting Oil is speeding the production pace of American industry in its race with War. Probably a similar speed-up can be accomplished in your plant. Call in a Sun Oil Company Engineer—write or phone your local Sun office.

SUN OIL COMPANY, Philadelphia

Sun Oil Company, Limited . . . Toronto, Canada



SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

Engineered **FOR COOLANT!**

VERNON UNIVERSAL TOOL AND CUTTER GRINDER

Precision to tenths on tool room or production jobs—wet grinding or dry—internal or external—these are performance features of the new Vernon Universal Tool and Cutter Grinder! Careful engineering, design and construction protects vital parts against coolant splash, provides long trouble-free life. INTERMEDIATE AUXILIARY DRIVE, POWER DRIVEN WORKHEAD, TWO-SPEED TABLE CONTROL, BALL BEARING TABLE ACTION and many other features make this Vernon the BUY in low-priced grinders. Our new folder describes all construction details. Write for free copy.



MACHINERY MANUFACTURING COMPANY

1915 EAST 51 ST. VERNON LOS ANGELES, CALIFORNIA

Vernon Line of

**HORIZONTAL MILLS, VERTICAL MILLS and
JIG BORERS, SHAPERS and GRINDERS**

DE-BURRING . . . FINISHING . . . POLISHING

HERE are four cases where all in one de-burring, finishing and polishing jobs have been accomplished in a single operation by Brightboy—an original and unconventional abrasive.

Time and work savings—plus a smooth, precision finish which frequently serves as a final polish—are achieved because of Brightboy's unique composition and working effectiveness. Brightboy is rubber, impregnated throughout with abrasive. Its "give" or resiliency creates the result which has led to its immediate approval and wide adoption in hundreds of war plants.

Try Brightboy on one of your jobs. Time the operation and compare the results. Write us if your dealer cannot supply you with Brightboy METHODS AND APPLICATIONS DATA, prices and catalogs. Our field representatives are at your service.

3 TEXTURES:

BRIGHTBOY STANDARD
for all-around metal finishing.

BRIGHTBOY FINE-TEX
for lighter work—
for fine polishing.

BRIGHTBOY TUFF-TEX
for harder metals.

WHEELS • STICKS

RODS • TABLETS

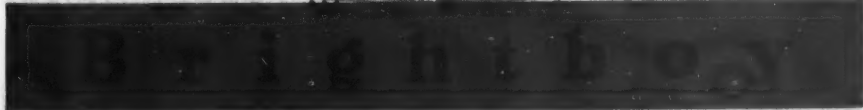
for manual and
machine operations.




**BRIGHTBOY
INDUSTRIAL DIVISION**



**WELDON ROBERTS RUBBER CO.,
Newark, N. J.**





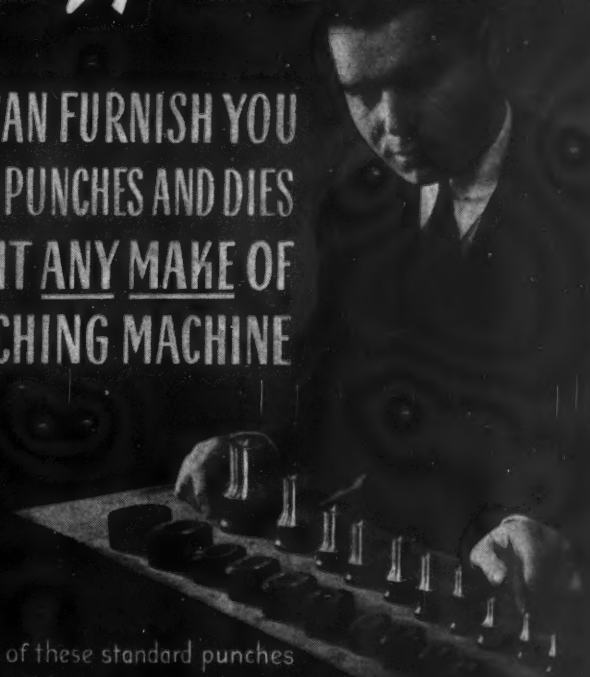
Precision grinding for aircraft — supremely important — is a fine criterion for surface grinding — and this thrust bearing ring is a typical example of the wide scope and versatility of **ARTER GRINDERS**. Innumerable aircraft engine parts are ground rapidly to close tolerances by **ARTER ROTARY SURFACE GRINDERS**.

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

Specify CLEVELAND'S

WE CAN FURNISH YOU
WITH PUNCHES AND DIES
TO FIT ANY MAKE OF
PUNCHING MACHINE



399 sizes of these standard punches
241 sizes of these standard dies
carried in stock for immediate shipment
as shown on accompanying ready reference tag

*Write for Small Tool
Hand Book*

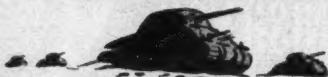
When you need Punches and Dies or other Small Tools such as
Chisel Blanks, Coupling Nuts, Rivet Sets, Shear Blades, etc. specify
Clevelands and your order will be shipped without delay.

Small Tools THE CLEVELAND PUNCH & SHEAR WORKS COMPANY *Cleveland, Ohio*

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH



Safety Wheel's contribution



to better, faster grinding of



National Emergency Steels-

... THE NEW

NO. 277

SAFETY WHEEL

"An outstanding contribution to the war effort." That's what users are saying about the revolutionary new bond used in Safety's No. 277 wheel. And that's what you'll say, too... once you have put this great wheel to the test. Developed after months of intensive research by the Safety Engineering Research Staff, the new No. 277 wheel is designed specifically for centerless and cylindrical grinding of National Emergency Steels. The sensational new bond in the No. 277 wheel provides faster grinding—improved cutting action—better finish. Possibility of breaking and

chipping has been reduced to a minimum. Production is speeded up—greater latitude of operations is provided.

The remarkable No. 277 Safety wheel with this unique new bond is now ready to do an outstanding grinding job for you. Made in practically every size, shape, grit, porosity and grade of hardness, there is a No. 277 Safety wheel exactly suited to your requirements. Write today for full details on how Safety's No. 277 wheel can produce new production records in your grinding operations.

The SAFETY Grinding Wheel and Machine Company
SPRINGFIELD, OHIO — SALES OFFICES IN PRINCIPAL CITIES — ESTABLISHED IN 1892

Manufacturers of SAFETY motor-driven portable Grinders, SAFETY "Rite-Speed" Grinders, Grinding Wheels for every purpose, including the famous SAFETY "Grip-Lok" Grinding Wheels

Grobet

ROTARY FILES

OVER 5000 SHAPES SIZES AND CUTS

Generation after generation of tool makers, instrument makers and die makers have accepted the "F. L. Grobet" Rabbit Trade Mark as a guarantee of precision and performance. Over a century and a quarter of progress and manufacturing excellence is integrated into every Genuine Grobet Precision Swiss File.

Learn more about these Swiss Files, made of chrome steel for greater durability. Write for catalog KF, the most complete of its kind. Also ask for catalog KM on Files for Filing Machines.

GROBET FILE CO. of AMERICA

421 Canal Street



New York, N. Y.

IMPORTERS OF GROBET SWISS FILES

MFRS. OF GROBET ROTARY FILES

October, 1943

MODERN MACHINE SHOP

93

More



THAN A POUND

In the Metal Finishing field, the name UDYLITE stands for better, more successful Cadmium Plating. Since 1919 Udyllite's famous research laboratories and staff of metal finishing engineers have pioneered the use of Cadmium—Developing new and better methods of application—Disseminating this information and improvements to the trade. . . . The benefit of Udyllite's years of experience is yours for the asking. When you buy Cadmium Anodes, plating equipment or supplies from Udyllite you receive "More than a pound". The "know-how" behind each Udyllite product is a *plus value* you cannot find elsewhere. . . . If you are not already a Udyllite customer we invite you to enjoy the advantages of Udyllite's complete metal finishing service.

★★★
BACK
OUR
BOYS
Buy Bonds

THE UDYLITE CORPORATION

1651 E. GRAND BLVD.

DETROIT, MICHIGAN

Chicago 12
1943 Walnut Street

Long Island City 1, N. Y.
11-16 44th Drive

Cleveland 3
4406 Carnegie Ave.

TANNEWITZ HIGH SPEED METAL CUTTING BAND SAWS

*... a far Faster
Means of Cutting
TEMPLATES*

from SHEET STEEL up to 1/4"

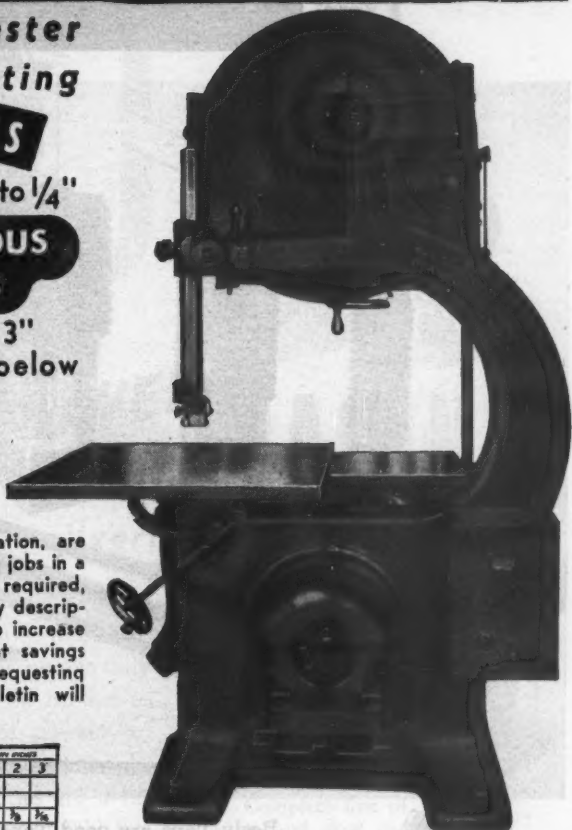
**NON-FERROUS
MATERIALS**

of all kinds up to 3"
thick — see chart below

**SAVE THEIR COST
IN SHORT
ORDER**

These superb machines, delivering over two miles of saw blade travel per minute without vibration, are doing hundreds of metal cutting jobs in a fraction of the time previously required, in metal working plants of every description throughout the country. To increase production and make important savings get the details NOW! A line requesting Metal Cutting Band Saw Bulletin will bring them to you promptly.

KIND OF MATERIAL	THICKNESS RANGE PER MIN. SECOND BY INCHES							
	1/2	3/4	1	1 1/4	1 1/2	2	3	
MILD STEEL	12-24	6	3	1				
STAINLESS STEEL	6	2	1					
YELLOW BRASS, ZINC	24	12	6	3	1 1/2	3/4	3/8	
BRONZE OR COPPER	6	3	1 1/2	3/4	3/8			
ALUMINUM	24-36	10	9	4 1/2	2	1 1/2	1	
DURALUMINUM	24	12	6	3	1 1/2	1	3/4	
SINGLE PLYMETAL				6	4			
DOUBLE PLYMETAL				4	3			
PLYWOOD	24-36	24	20	16	12	6	3 1/4	
ASBESTOS BOARD	24	12	6	3	1 1/2			
PAPER BOARD	24	12	6	3				
FIBRE (HARD)	24	12	6	3				
PAPER BOARD	24	10	12	4	2	1/2		
MASONITE	24	10	12	6	3	1 1/2	3/4	
BAKELITE	12	6	3	1 1/2	3/4	3/8		



PERFECTLY SAFE: Two-wheel Lockheed Hydraulic Brakes automatically and instantly stop the wheels in case of saw blade breakage — completely guarded.

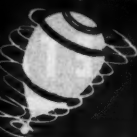
Send for bulletins on Single and Variable Speed Foundry Band Saws. Also Di-Saws, combination band saws for sawing, filing, polishing.

Made by Sawing Machinery Specialists

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

BESLY

TAPS ARE TOPS



Besly Taps are good Taps. Every step of our manufacturing process is closely watched to the end that taps bearing the name "Besly" do perform as they should. When you think of tapping remember Besly Taps are "tops".

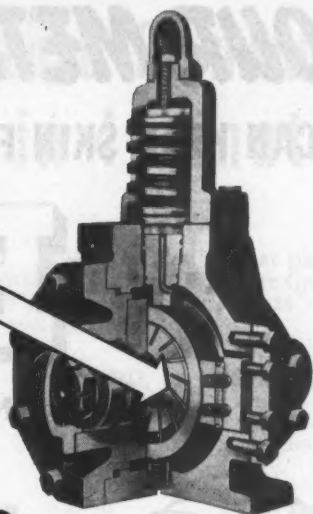
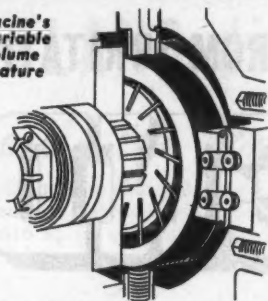
Send for **CATALOG No. 67**

It has a wealth of useful information for Tap users

CHARLES H. BESLY & COMPANY

**118-124 NORTH CLINTON ST., CHICAGO, ILLINOIS
FACTORY: BELOIT, WISCONSIN**

Racine's
Variable
Volume
Feature



SAVE HORSEPOWER WITH RACINE

OIL HYDRAULIC — "variable volume" PUMPS

The "Variable Volume" design of Racine Pumps provides the most efficient use of power—for it pumps only the minimum amount of oil needed to do the job. No waste of power—no relief or by-pass valves required—reduces oil heating. Capacities are 0-12, 20 and 30 G.P.M. at 50 to 1000 lbs. pressure per sq. inch.

RACINE Oil Hydraulic FOUR-WAY VALVES

Racine's "Balanced Piston—Sleeve Type" construction assures complete hydraulic balancing and smooth oil cushioned operation. Complete line of valves for pressure and flow control. Sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ ".



Complete data and prices on Pumps and Valves on request. Address Dept. MM-P.

Racine Hydraulic Metal Cutting Saws
The Production Saws of Modern Industry. Available in a wide range of designs and prices. Capacities 6" x 6" to 20" x 20".

RACINE TOOL AND MACHINE COMPANY

Standard for Quality and Precision

Racine • Wisconsin • U. S. A.

YOUR METAL-WORKERS

CAN KEEP SKIN FREE FROM IRRITATION

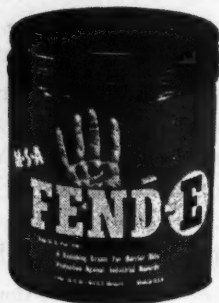
WITH
M·S·A

FEND

INDUSTRIAL CREAMS
AND LOTIONS

Protect your workers against skin irritation, rash and soreness with FEND. Six different FEND Creams and Lotions provide *safe, positive, proved protection* against many-score skin affections. Easy to apply and remove.

Write for descriptive Bulletin FA-79.



MINE SAFETY APPLIANCES COMPANY

Braddock, Thomas and Meade Streets
PITTSBURGH, PENNSYLVANIA

Competitive brand required 30 minutes CORTLAND did it in 4 minutes

Here's the story . . .

Production Test Run at plant of large electric and manufacturing company . . . Hanchett No. 36 Vertical Surface Grinder. Wheel speed 880 R.P.M.; table speed 36 R.P.M. *Work:* solid circular plate 28" O.D., 1/2" thick; 616 sq. in. surface ground per piece—1 piece per table load.

	CORTLAND	Brand formerly used
Stock Removal0140	.0115
Rate of Feed*024 - .012	.008 - .004
Cubic inches of stock removed per inch in height of segments	187.6	123.4
Ampere Readings	0 to 50	100 to 125
Dressings Necessary	None	1, rem. .005
Work Heat?	No	Yes
Grinding Time	4 min.	30 min.

17-M

* Faster rate at start grinding high spots. Feed of competitive segments had to be stopped when ampere readings climbed up.

DIAGONAL SHEARING



Shock and resistance minimized as narrow end of segment starts grinding action. Large surface still exposed to coolant. Diagonal motion of straight inner edge of segment produces powerful shearing action. Increasing contact combines rapid stock removal with minimum heating.



Maximum area of segment in contact with work momentarily. As segment continues to pass across work, grinding area becomes smaller, with more surface exposed to coolant.



CORTLAND *Segmental Chucks*

CORTLAND GRINDING WHEELS CORP. • CHESTER, MASS.

In War, as in Peace...

CERRO ALLOYS

SAVE TIME and CUT COSTS!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, for engraving machine models, stripper plates, chucks, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc.; as a filler behind delicate parts to be machined or ground in profiling or duplicating machines; sprayed on to protect wood core molds and patterns. Low temperature melting prevents distortions.

● **WRITE** for literature on any of the above alloys. Prompt deliveries on orders bearing Preference Rating A-1-J or better.

These three low-temperature melting alloys are helping to speed up production of war materials for the Army, Navy and Air Force.

Representatives and Distributors

Brooklyn, N. Y., Belmont Smelting & Refining Works
Ansonia, Conn., Jackson Associates
Boston, Mass., Jackson Associates
Philadelphia, Pa., Castaloy Metal Sales Co.
Cleveland, Ohio, Die Supply Co.
Detroit, Mich., Castaloy Metal Sales Co.
Chicago, Ill., Sterling Products Co., Inc.
Moline, Ill., Sterling Products Co., Inc.
Milwaukee, Wis., Harry C. Kettleson, Inc.

Minneapolis, Minn., Northern Mch. & Supply Co.
St. Louis, Mo., Metal Goods Corporation
Kansas City, Mo., Metal Goods Corporation
New Orleans, La., Metal Goods Corporation
Dallas, Tex., Metal Goods Corporation
Houston, Tex., Metal Goods Corporation
Los Angeles, Calif., Castaloy Metal Sales Co.
Montreal, Can., Dominion Merchants Ltd.
London, Eng., Mining & Chemical Products, Ltd.

CERRO DE PASCO COPPER CORPORATION

40 WALL STREET - - - NEW YORK, N. Y.

The SHEFFIELD MICRO-FORM GRINDER

With Pantograph and Microscope

**FINISH GRINDS PROFILES
DIRECT FROM DRAWING**

*No Templates
Nor Masters*

- Grinds both circular and flat form tools, templates, profile gages, cams, dies, etc. to accuracy of .0003".
- Especially suited for grinding cemented carbides and hardened steel.
- Grinding time, especially on intricate profiles, reduced as much as 50-75% compared to other methods.
- Not limited by regularity nor irregularity of work, nor by straight lines, angles or curves.
- Can be used reversely for making layouts from parts having unknown profiles, and for checking parts against layout drawings.



Manufactured under
Patent No. 1,811,940

WRITE FOR FULL DETAILS • BULLETIN M-120-143



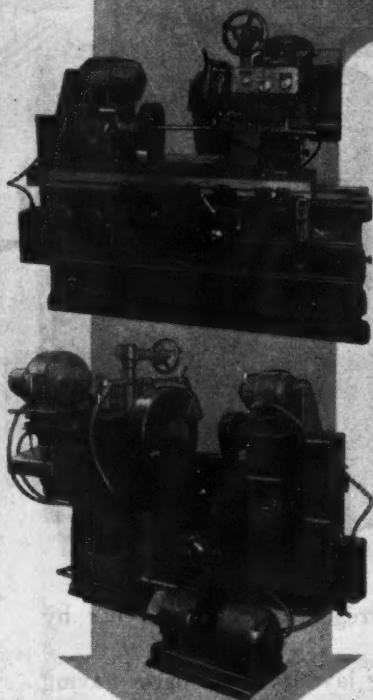
THE SHEFFIELD CORPORATION

Dayton 1, Ohio, U.S.A.

MACHINE TOOLS — GAGES — MEASURING INSTRUMENTS — CONTRACT SERVICES

A New

FITCHBURG TYPE-B GRINDER



NEW IMPROVED FITCHBURG TYPE-B 10" PLAIN CYLINDRICAL AUTOMATIC PRECISION GRINDER

The Fitchburg Type-B Plain Cylindrical Automatic Precision Grinder has been improved — into this new Type-B has been built new features for increased work production, greater accuracy, and finer finish.

New improved controls increase the ease of operation — push button controls are all located at the operator's finger tips.

It handles a wide range, and a number of types of jobs (up to 10 inch swing), and the automatic precision features leave the machine operator free to operate a second machine — thus cutting man-hour cost on every piece produced.

Write today for complete details and information.

FITCHBURG GRINDING MACHINE CORP.
FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bench Grinders, Wheelhead Units, Multiple Precision Grinding Units, Spindle Grinders, Cylindrical Grinders, G.A. Grinders, Both Full Universal Grinders and Special Purpose Grinders

Reciprocating

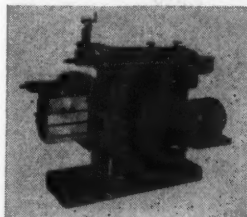
Hy-Draulic

Machine Tools

To Help You Keep 'Em Rolling

Whether you build munitions, run railroads, or operate other essential services . . . you can depend upon Hy-Draulic Shapers, Planers, Slotters and Shaper-Planers for important help in the war-winning job of keeping 'em rolling on production lines, roads and rails. These machines, and these *only* in their classifications, have hydraulic drives that provide unlimited numbers of cutting speeds and feeds in specified ranges. Quickly, easily and without stopping the machines, operators can get the exact combination of speed and feed for best results on work in process. They can reverse or "short-stroke" rams or tables at any point. Centralized controls and power rapid traverses promote easy set-up and high output.

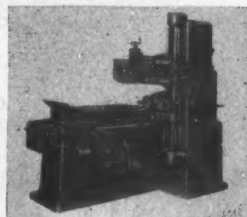
Special Uses: In addition to high accuracy, speed and convenience on conventional work, Hy-Draulic Machine Tools have many special uses in machining weldments, forgings, castings, die blocks and other work pieces. Our wide experience in the application of Hy-Draulic Machine Tools is yours for Victory. Send drawings and complete data for quotations on special machines. On standard machines, write for Catalog Number 1602.



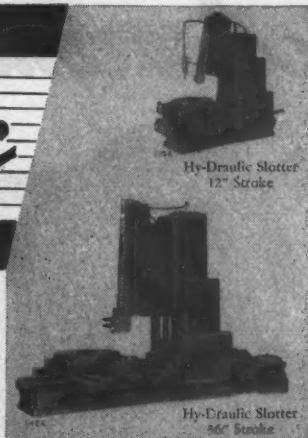
Hy-Draulic Shaper
12" High Speed



Hy-Draulic Shapers
16" to 28" stroke

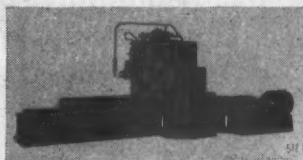


Hy-Draulic Shaper
36" Openside

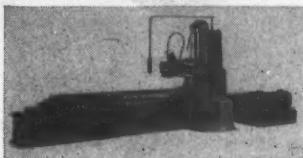


Hy-Draulic Slotter
12" Stroke

Hy-Draulic Slotter
36" Stroke



Hy-Draulic Planers
Double-Housing shown, Openside available



Hy-Draulic Shaper-Planers
66" to 144" stroke

Hy-Draulic

Shapers, Planers, Slotters, Shaper-Planers
ROCKFORD MACHINE TOOL CO.

Anaconda Wire and HEVI DUTY FURNACES

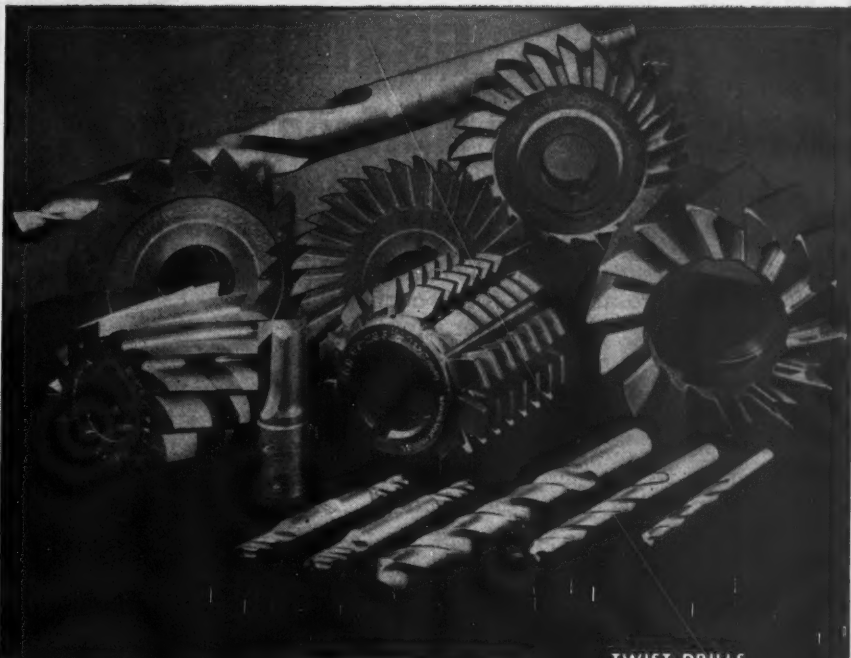


A Hevi Duty Muffle Furnace in
the Anaconda Laboratory

In the never ending
quest for better wire
and better cable . . .
Anaconda carries on
continual research and development in their
chemical and metallurgical laboratories. For
experimental heat treating in the laboratory,
Anaconda uses a Hevi Duty Muffle Furnace.

Send for Bulletin HD-535
— it describes Hevi Duty
Muffle Furnaces.

HEVI DUTY ELECTRIC COMPANY



UNION

The Complete Line

War production demands perfection in every metal-working job — so choose your tools from the complete Union Line. Now, when aircraft and munitions jobs are making their greatest demands on tools and machines, it is Union fine tool features . . . Union high metallurgical standards . . . Union ruggedness and accuracy that are making them — more than ever before — The Tools You Buy Again.

TWIST DRILLS
MILLING CUTTERS
GEAR CUTTERS
HOBS SAWS
TAPS REAMERS
END MILLS DIES
SCREW PLATES

UNION TWIST DRILL COMPANY

ATHOL

MASSACHUSETTS

STORES

New York - - 61 Reade St.
Chicago - - 11 S. Clinton St.
Detroit - - 6540 Antoine St.

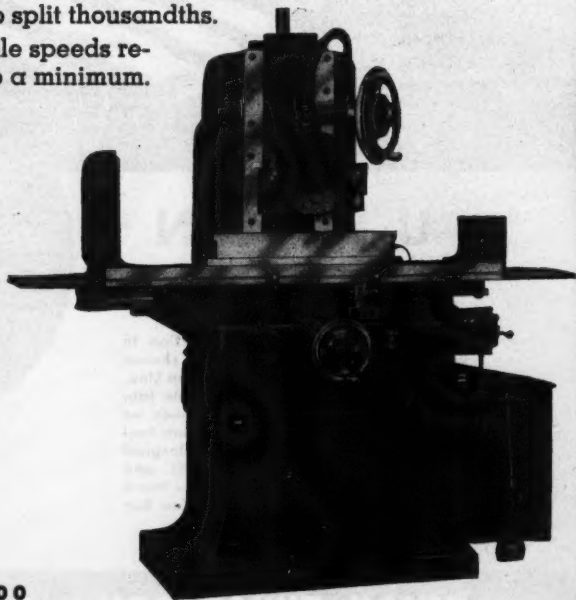
San Francisco - 121 Second St.
Los Angeles - 524 E. Fourth St.
Seattle - 568 First Ave., South

*Hydraulic
feed*

GRAND RAPIDS Surface Grinders

**To Meet 1943's Exacting
Needs --- as nothing else can**

- "Grand Rapids" Hydraulic Feed Surface Grinders guarantee tool room accuracy at table speeds up to 125 feet per minute.
- Heavy rugged one-piece column and base casting assures permanent alignment between the cross travel ways and the upright head.
- Patented vertical movement of wheel head makes it possible to split thousandths.
- Two usable spindle speeds reduce wheel costs to a minimum.



**WRITE FOR
CATALOG GL-100**

No. 35 Precision Tool Room Type

GALLMEYER & LIVINGSTON CO.

308 STRAIGHT AVE. S. W.

GRAND RAPIDS 4 MICHIGAN

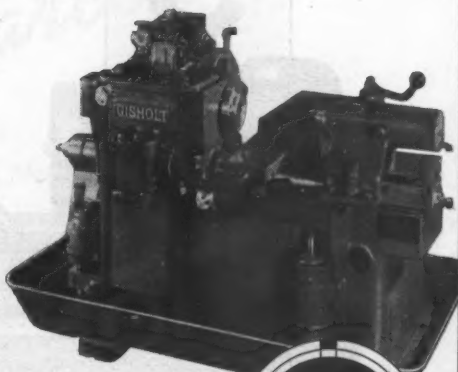
TOO MUCH, TOO SOON FOR THE AXIS!

In only four short years, the American machine tool industry has built more tools than were produced in the previous forty. They're better tools, faster, more accurate, easier to operate.

Today, they're all working in essential war industries. They're winning the battle of machines against machines. You may be confident that they're helping America create an irresistible striking power that our enemies will never match.

GISHOLT MACHINE COMPANY
1219 East Washington Avenue • Madison, Wisconsin

*Look Ahead . . . Keep Ahead . . .
With Gisholt Improvements in Metal Turning*



THE GISHOLT AUTOMATIC HYDRAULIC LATHE requires so little attention that one man (or woman) can tend two or three machines. Easy tool set-up and adaptability to handle a variety of work, make it practical to use its high machining speeds even in small lot production.

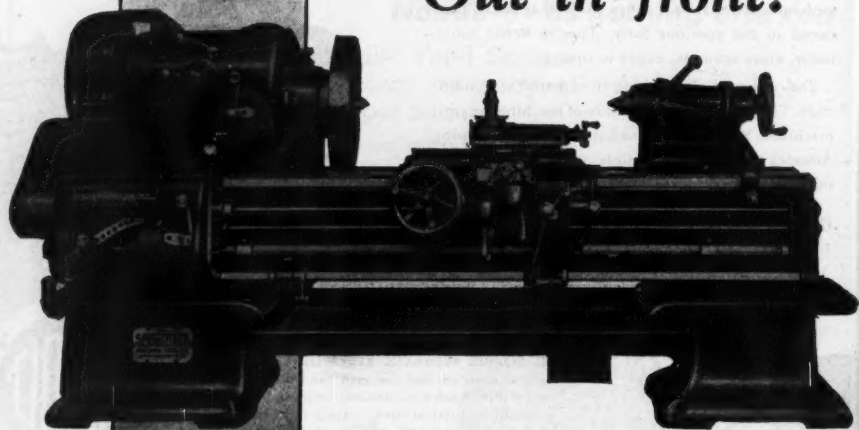


TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

S

SPRINGFIELD PRECISION LATHE

Out in front!



**SEND TODAY
FOR BULLETIN
No. 161**

Tells the why and
how of Spring-
field's accurate
production.

● Headstock . . . twelve speeds . . . only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-belt or silent chain drive.
Bed . . . permanently true—made of high test alloy to resist warp or marring under severe service.

Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

From headstock to tailstock—the **SPRINGFIELD Lathe is out in front!**

THE SPRINGFIELD MACHINE TOOL CO.
SPRINGFIELD • OHIO, U. S. A.

LIPE

Carbo-Lathe



FASTER on ALL THREE:



1. High Brinell Steels 2. Non-Ferrous Metals 3. Plastics



★ Designed especially for sintered carbide tools, it has the rigid massiveness and the smooth-flowing power to take hogging cuts and feeds on high-Brinell NE, SAE or Invar steels . . . and the high-spindle speeds for low-cost turning of non-ferrous metals, plastics, and other fast-cutting materials. Just what you need for peace time conversion. Write for specifications and delivery dates.

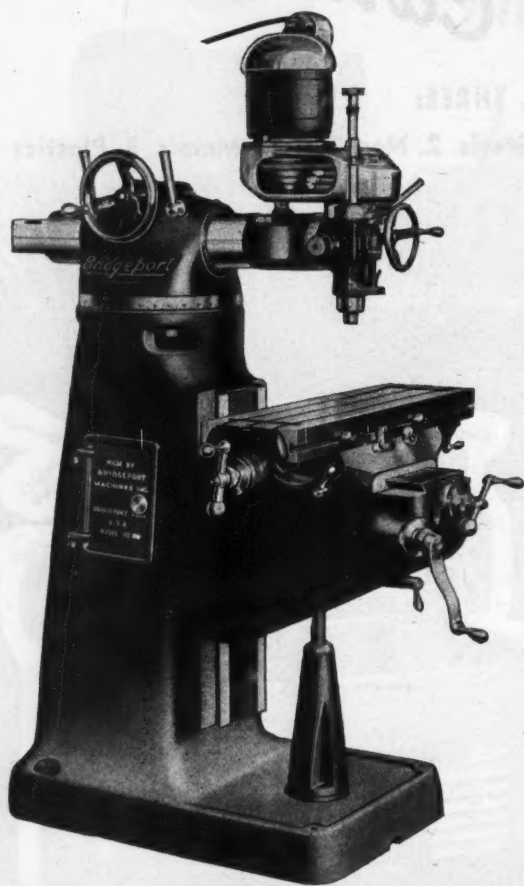


LIPE

-ROLLWAY CORPORATION

SYRACUSE, N. Y.

Bridgeport



TURRET MILLING MACHINE

*Flexibility
Rigidity
Unparalleled
Range*

●
AN outstanding product weighing 1600 lbs. with unusual range for large tool and fixture work yet extremely sensitive for fine milling on molding dies.

●
Also, high speed milling attachments for all makes of milling machines.

●
Write for further details.

BRIDGEPORT MACHINES, INC.

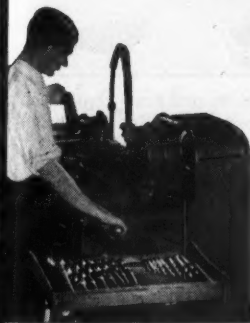
52 REMER STREET

BRIDGEPORT, CONN.



*It can't
be wrong!*

GROUND WITH THE SCIENTIFICALLY CORRECT SELLERS POINT



TYPE 6-G

That's the beauty of Sellers Drill Grinders. With less than a day's instruction a fair-haired novice can become a white-haired expert. He (or she) depends not upon individual skill but on the *automatic* locating of the drill in the chuck to produce a correctly formed point.

It is obvious that the Sellers Drill Grinder reduces drilling costs by turning out free cutting, accurate drills that can be operated at most efficient speeds, thus greatly increasing the number of holes per grind... It lengthens drill life and reduces drill *inventory*... It provides you with drills that produce truly cylindrical holes and maintains a constant supply of correctly sharpened drills at all times.

Write today for detailed information. Wm. Sellers & Company, 1614 Hamilton St., Phila.



CABINET TYPE 1-G

SELLERS

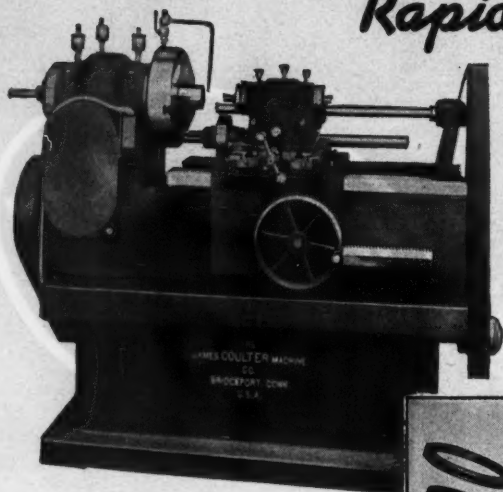
PRECISIONEERING SINCE 1848

Rapid Duplication

of

**RIGHT OR LEFT HAND
THREADS**

INTERNAL OR EXTERNAL



COULTER

Type "H"



Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures... can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of feeds and speeds.

Write for complete specifications.

The James **COULTER** *Machine Co.*
BRIDGEPORT • CONNECTICUT • U.S.A.

GAMMONS

REAMERS



Manufacturers of

The Gammons Helical Taper Pin Reamer

The Gammons Helical Chucking Reamer

The Gammons Helical Die Maker's Reamer

The Gammons Duplex Taper Pin Reamer

Special reaming problems invited

Send for Catalog

THE GAMMONS-HOAGLUND CO.

MANCHESTER

CONNECTICUT

SAVE YOUR MACHINES!

CUT WEAR AND REPAIRS

... STEP UP OUTPUT



Patented
DIAMOND GRIP
HOLDS TIGHTER
SELF-CLEANING

Sutton Patented Diamond Grip Collets take horizontal and rotation thrusts at an angle and hold stock fast with 10% to 15% less locking tension—reducing strain and wear on machine and parts.

With slippage cut to practically zero, machine cycles can be stepped up to tool capacity—you get more pieces per hour.

Diamond Grip is self-cleaning . . . does not clog like ordinary, square-cut grip . . . you get less scrap . . . costs no more than ordinary collets.

See our representative or send for Catalog 15

SUTTON TOOL COMPANY

2895 W. Grand Blvd., Detroit 2, Michigan

SUTTON



COLLETS

STOP- SCRAPPING WORN GAGE BLOCKS!

*They're worth money
to you...*



Are you throwing out worn gage blocks? If you are—stop it now and turn them in to Webber Gage Co. You can salvage your old gage blocks—Webber will allow you 10% on all replacement blocks in exchange for your worn or damaged blocks.

Here's a saving in the cost of blocks and one that will pay dividends in maintaining dependable accuracy of production.

The accuracy of Webber Gage Blocks is recognized by a host of manufacturers now using Webber Gage Blocks in all phases of manufacture from the laboratory to the production line.

Remember—Webber is the largest exclusive manufacturer of Gage Blocks. Webber Gage Blocks are produced with the most modern equipment—under ideal conditions—by men experienced in the craft.

Webber also provides attractive delivery on both A and B accuracy gage blocks.

Set No. 84 contains 84 blocks in sizes from .050" to 4.000". Range .100" to 12.000" in steps of .001", .200" to 12.000" in steps of .0001".

Price Set No. 84A—\$350.00
Set No. 84B—\$235.00

Set No. 43 contains 43 blocks in sizes from .100" to 4.000"—ideal for tool rooms and small shops. Range .200" to 10.000" in steps of .001", .300" to 10.000" in steps of .0001".

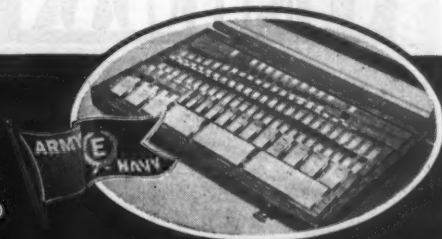
Price Set No. 43A—\$185.00
Set No. 43B—\$150.00

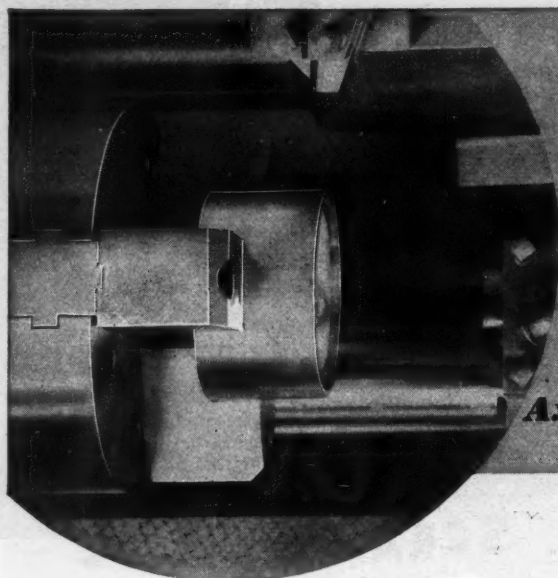
All "A" accuracy sets are accurate within .000004"—all "B" accuracy sets within .000008". Set No. 38 (Thin Blocks) is supplementary to Set No. 84. Range .100" to 4.000" in steps of .001", .150" to 4.000" in steps of .00005".

Price Set No. 38A—\$195.00
Set No. 38B—\$155.00

Webber GAGE COMPANY

12899 TRISKETT RD., CLEVELAND 11, OHIO





**Every time
you close
these jaws
our grip on the
Axis grows tighter**



● Every gun . . . every tank . . . every plane . . . every rifle and truck, bombsight and bomb, ship and torpedo . . . that goes out of America's arsenals to speed our victory, very largely consists of parts that were formed in the jaws of chucks. No piece of production equipment is more directly engaged in the "front line battle". Therefore we say to Cushman Chuck users . . . get the last ounce of efficient productive effort out of your chucking equipment. Let us help you make sure that the correct types are used to handle each job most efficiently. Make sure that your operators follow simple maintenance rules that prolong chuck life and assure accuracy. Help us speed your deliveries of needed new chucks by correct specifications in ordering, by anticipating your needs as far in advance as possible and by furnishing suitable priorities. We will be glad to send you copies of the Cushman Catalog and Data Book, also supplies of "Chuck Check" maintenance cards on request. The Cushman Chuck Company, Hartford, Conn.

CUSHMAN

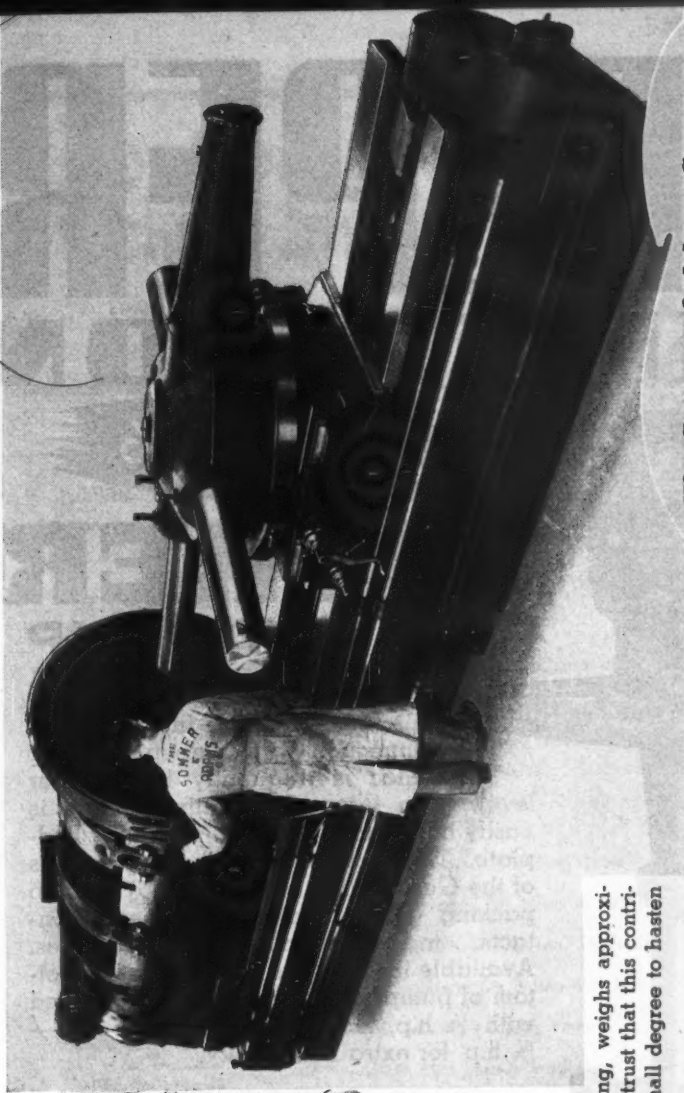
A World Standard for PRECISION

These small "Chuck Check" maintenance cards can be given to operators or put on bulletin boards. They'll help save time, save chucks and reduce spoilage. Ask us to send you some.





Typical of special equipment designed and built by Sommer & Adams is this large boring and thread milling machine, which handles those operations on the breech rings of 5" guns. It is 22 feet long, weighs approximately 60,000 pounds. We trust that this contribution may help in some small degree to hasten the coming of final peace.



The Sommer & Adams Company places at your command a 25-year acquaintance with the intricacies of special machine design and construction.



THE SOMMER & ADAMS
18311 EUCLED AVENUE
CLEVELAND, OHIO

Custom-Built EQUIPMENT FOR MANY PURPOSES

DEEPER IMMERSION



Model TL 15026

GUSHER COOLANT PUMP

This forms a simple installation in connection with a deep reservoir which is frequently below floor level. The integral mounting flange is easily bolted to the reservoir cover or bed-plate. This model has all the advantages of the Gusher line: not injured by grit; no packing glands; no metal-to-metal contacts, and other outstanding features. Available in 2 lengths (from flange to bottom of pump) 25 $\frac{1}{2}$ " and 19 $\frac{1}{2}$ ". Equipped with $\frac{1}{2}$ h.p. motor for continuous duty— $\frac{3}{4}$ h.p. for extra heavy duty.

**Write for data and
specifications.**

THE RUTHMAN MACHINERY CO.

1817 READING ROAD

CINCINNATI, OHIO

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS